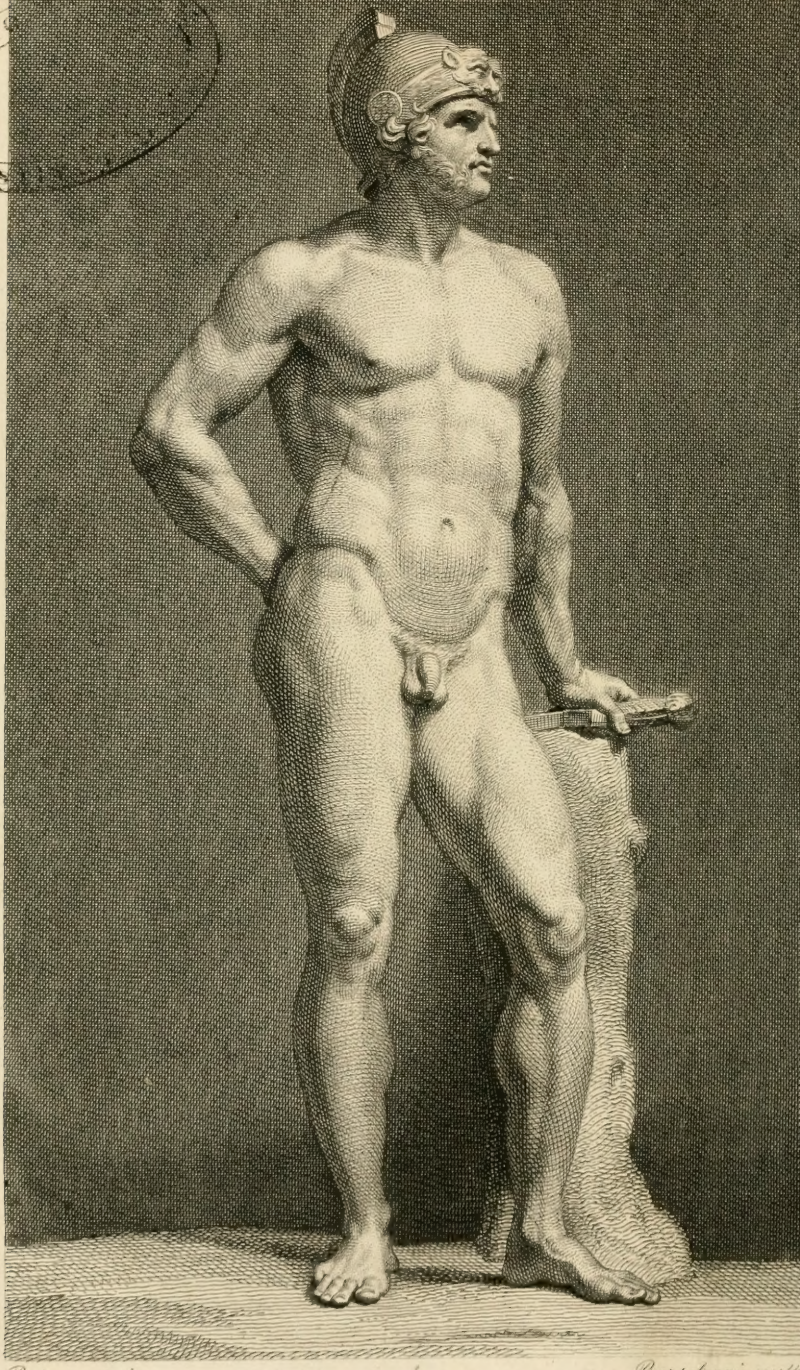

Palmer delin. *Bartolozzi sculp.*

MARS.

From a Statue by Mr. Bacon.

Tech R Royal Society of Arts, London

TRANSACTIONS

OF THE

SOCIETY,

Instituted at London,

FOR THE

ENCOURAGEMENT

OF

ARTS, MANUFACTURES, AND COMMERCE;

WITH THE

PREMIUMS OFFERED IN THE YEAR 1787. -88

5-6

VOL. V.

THE THIRD EDITION.

LONDON:

SOLD BY THE HOUSEKEEPER, AT THE SOCIETY'S HOUSE IN THE ADELPHI;

AND BY ALL BOOKSELLERS.

[*Price Seven Shillings.*]

MDCCCXXII.

624485
1.12.55

T. C. Hansard, Printer, Peterboro' Court, Fleet Street, London.

PREFACE.

THE great number of ingenious and respectable persons, who are continually becoming Members of the Society, is a sufficient proof of the satisfaction the Public feel at the annual appearance of these Volumes: and it is the hope of the Society, that the following pages will be found to contain some very useful information, under each of the several heads into which the business is divided.

In AGRICULTURE, the account of the manner of forming a very extensive plantation in the northern part of England, cannot fail to give pleasure to all lovers of that very useful branch of cultivation, the growth of Timber; and whoever has perused the foregoing volumes of these Transactions, must have seen, with great satisfaction, the many rewards bestowed by the Society on Mr. White, for his spirited and almost unequalled attempts, at the improvement of his Estate at Butsfield.

Under the same class of Agriculture, are also inserted some experiments to discover a mode of preventing the depredations of the Fly on Turnips. Should the efficacy of this method be satisfactorily confirmed, by future trials, one of the most wished-for objects in farming, will be happily obtained; and it may not here be improper to say, that the Society will receive with particular pleasure, any accounts of experiments made on so interesting a subject.

Of the plant recommended in the letter from Thomas Boothby Parkyns, Esq. it need only be observed, that a pamphlet, giving a full detail of its virtues, has been printed on the continent, from whence great part of the letter hereafter inserted has been extracted; and as a trial of its uses is now making, on a large scale, in England, the full merits of it will be soon known. In the mean time, it is but justice to hint, how much this country is obliged to those gentlemen who, in their foreign travels, employ their time in searching for those things which may prove really valuable to their native land, and generously communicate them to the publick.

A method of destroying Ants, Spiders, and other Insects in hot-houses and pineries, is laid before the public in this volume; and if the in-

structions given are observed, will prove certainly efficacious, but ought to be used with caution.

Several attempts have been made, and many contrivances produced, for an easy method of cutting straw for feeding cattle. In the following sheets, a full description and plate of a machine for that purpose, of a simple construction, and small cost, is inserted, which may be used by any person capable of turning a Winch; and this is the principal advantage these instruments have over those that have long been in common use throughout the kingdom, in which the various motions required to bring forward and cut the straw into tolerably equal lengths, require a dexterity in the person cutting it, which long practice only can give, and therefore cannot be done by common labourers.

Under the head of Agriculture will be found some letters on the Drill-husbandry, which relate to experiments made on a scale hitherto unattempted, and which serve to throw a full light on that interesting question which has so long and so often employed the attention and pens of Agriculturists—Is the Drill or Broadcast method of culture the most advantageous ?

Under the head of CHEMISTRY, is inserted an account of an easy and practicable method of securing Stone Retorts from breaking, or stopping any cracks in them during an operation. The name of the author of this paper, who is well known to be an excellent practical chemist, and who has long used this method in his elaboratory, is a full assurance of the efficacy of the method prescribed; every one versed in chemical experiments, and knowing the danger and loss that frequently follow the breaking the distilling vessels, will think themselves happy that such a discovery has been laid before the public.

In the class of POLITE ARTS, a full account will be found of a method of imitating the manner of painting practised by the ancients, in which, when experience shall have fully proved its superior utility to the common method of painting in oil, the advantage of wax, as a vehicle, will be evident: and here again is another instance on record, of the benefit of foreign travel; when the mind of the traveller, as in the case of Miss Greenland, directs itself to objects of real utility.

Under the head of Polite Arts, will also be found a particular account of the method pursued,

at an Academy not far from town, with remarkable success, for the instruction of young gentlemen in the Latin Tongue. The letter from Dr. Egan so fully explains the mode practised by him, that it is unnecessary to enter into a more full detail in this place, except it be to observe that the proficiency of his pupils was such, as to induce the Society to vary from their usual procedure, and bestow more rewards on them, than the words of the advertisement gave them any reason to expect.

In the same class is given a particular description of a mode of instructing blind persons in music, more commodious and extensive than that commonly employed; and as every humane mind will rejoice at those attempts which aim at alleviating the misfortunes of our fellow-creatures, and at the same time promote the ornamental parts of education, there is no doubt the paper by Mr. Cheese will afford much satisfaction.

In MANUFACTURES the reader will find two letters on the breeding and feeding Silk-worms, showing the practicability of establishing the making Silk to advantage in this climate: and to forward the views of the reverend gentleman to whom the Society is obliged for one of those

letters, some Premiums have been thrown out to the public, for the encouragement of planting mulberry-trees, as the want of food seems the only obstruction to the carrying this desirable object into full execution.

The other letter on this subject, written by Miss Rhodes, of Bridgnorth, whose papers inserted in the fourth volume of the transactions, have already been so favourably received, points out, in a forcible manner, so certain a mode of preventing any accidents that may arise to the worms, from the change of weather, to which this country is subject, that little reason remains to doubt the certainty of raising, to advantage, the Worms, and carrying on the manufactory of silk with profit, in this Island.

Under the head of MECHANICS is inserted a history, description and representation of a Hydraulic Machine: this account was written, and the drawings made, by a gentleman of such established reputation, as leaves a full assurance of the utility of the machine, which promises to be on many occasions of great consequence in very important works.

Few things, particularly in hot climates are of more importance to the inhabitants, than good

methods, of preserving Water; and to those who are acquainted with the nature of that species of earth called Puzzolana, or Tarris, little need be said to show of what great utility the discovery of such a material as is mentioned in the paper under the class of Colonies and Trade, will be to the island of Jamaica. It is true that earth has been already employed for some of the most useful purposes to which it is applicable, by the inhabitants of that island; but the nature of it being now made publicly known, other countries trading to Jamaica, may have the advantage of purchasing it for their own uses, and to the emolument of the proprietor: for though the distance of that island, from Great Britain, will perhaps not admit the bringing it to advantage hither; yet the countries nearer to the place where it is found, will now be informed, where so useful a material may be procured; and one great end of this Institution, the communication of useful discoveries from one part of the British dominions to another, be answered.

Under the different heads of PREMIUMS offered for the ensuing year, some new ones will be found of considerable consequence to the improvement of the Agriculture and Manufactures of the kingdom; and particularly under the head of Chemistry, a Premium has been introduced, for making fine Bar Iron with pit coal, an object of the

highest importance to this country, and which the great improvements made within these few years, by the spirited exertions of the manufacturers in that branch, render it probable, may, in no great length of time, be accomplished. When the large sums of money sent to Russia, Sweden, &c. for this necessary article, and the immense mines of ore and coal in these kingdoms, are considered; no Premium can be bestowed, by which the good of the country will be more advanced, than for obtaining this great and desirable end.

And here it may be proper to mention, that at length the Society has obtained an object long sought after by them, that is, a Paper manufactured in England equal to the French, for receiving impressions from Mezzotinto and other engraved copper-plates. The Premium for this article not having been adjudged to the candidate, Mr. Bates, of Wycombe-Marsh, Buckinghamshire, until the year 1787, a more particular account is deferred to the next Volume of Transactions: suffice it therefore to say, that all the plates in this volume are taken off on that paper, and the public are now enabled to form a fair judgment of it. It may not here be amiss to say, that, in order to show to the world at large the merit of that ingenious artist Mr. Bacon, the frontis-

piece of this volume represents the statue of Mars, in the Society's great room, of which mention has been already made, Vol. III. page 135; and that full justice might be done to that excellent piece of sculpture, the engraving has been executed by the celebrated Mr. Bartolozzi, whose works are at this day in the highest reputation throughout Europe.

There remains now only to add, that the Society will be happy to receive any communications that may tend to promote the Arts, the Manufactures, or the Commerce of these kingdoms; and those that are found deserving, will be inserted in in some future volume in a manner that may do credit to the authors, whose names will thereby be transmitted to posterity as having contributed to the welfare and prosperity of their native country.

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OF THE VOLUME.

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Plate of Mr. Westgarth's Hydraulic Engine to face page 82.

PAPERS

IN

AGRICULTURE.

GROWTH OF TIMBER.

IN the preceding Volumes of the Society's Transactions, mention has been made of the large Plantation formed by Thomas White, of Retford, Nottinghamshire, Esq. at Butsfield in the parish of Lanchester and Bishoprick of Durham; and accounts given of the several Medals adjudged to Mr. White for the different kinds of trees planted on that Estate. This year the Society having received Certificates properly authenticated, by which it appeared, that there had been planted at Butsfield, between the third of February, and the eighth of April, 1784, thirty-one acres four perches of land, with thirty-seven thousand two hundred and thirty Alders, from two years old to four, transplanted in order to raise Timber, which are well fenced round with a good stone wall, five feet three inches high, and the trees shooting with great vigour; the Gold Medal, being the premium offered for planting Alder, was adjudged to Mr. White; from whom also the following account of that Plantation has been received, for which the thanks of the Society were given him.

N° I.

Mr. WHITE's *account of his Plantation at Butsfield in Durham.*

Retford, Notts,
SIR; Jan. 31, 1786.

As I have been so happy as to receive many honorary rewards from the Society for the Encouragement of Arts, Manufactures and Commerce, for planting many different kinds of trees upon my infant estate at Butsfield plantations, in the county of Durham; a sense of gratitude for such liberal and distinguished marks of the Society's favour and attention, paid to my feeble endeavours to prosecute so useful a work, has encouraged me to trouble you with this letter; begging the favour of you, to lay it before the Society, at your leisure.

The promoting of useful knowledge being their ultimate wish, I shall be particularly happy, if my letter may in the smallest degree be acceptable to them, by conveying an account of the progress and success of my plantations.

As I had long entertained a favourable idea, founded upon observation and experience, of the great profits, as well as national utility of planting; and being determined to go upon a large scale, both for the important article of shelter, as well as for the great saving in point of fencing; my plan being to plant a thousand acres, I spent some time in looking out for a proper subject. The great

objects of my researches were, first, to find a good internal market for the sale of my wood, and if it so happened, an opportunity of exporting it to distant markets; secondly, to find in such a neighbourhood an easy purchase of a large tract of freehold land, of such a quality as rendered it of little value for producing corn or grass, and at the same time not unfavourable for the growth of wood, and containing good resources for making proper fences, and erecting buildings, &c. for protecting it. I was at length happy enough to find a situation that promised all those advantages, the quantity of acres excepted, which I could not meet with upon so large a scale as I wished; my first purchase being no more than two hundred and twenty-seven acres: but as it lay in the internal part of a large common of seventeen thousand acres, which was then dividing by commissioners under an act of inclosure; and as that part of the common, from its quality and situation, was not likely to become an interesting object to the circumjacent proprietors, who bordered upon this large tract, and whose property in general lay at a distance from it; I had good reason to believe, that I could accomplish my plan, by purchasing near at hand what I had occasion for at an easy rate; and I had some time afterwards an opportunity of buying three hundred acres more within the shelter of my first purchase; both which lay within the vicinity of the great national coal-works, of which Newcastle is the port for exportation: and also within a marketable distance of a large tract of country through which runs the river Weare, abounding with lead mines, which together with the collieries create an immense consumption of wood; particularly small wood, the growth of a few years: there is likewise a considerable demand for wood for many other purposes, especially for charcoal.

Many of the natural woodlands, in the county of Durham were almost exterminated, owing to the indiscriminate mode of cutting them, and the shameful neglect of the fences, which exposed them to the constant ravages of cattle, making wood a very scarce and dear article in the country. With these advantages before me, happy in the prospect of benefiting my family, and serving my country, in a way so agreeable to myself; about ten years ago I began to inclose my first purchase with a stone wall near six feet high, which was accomplished the same year; I also built several cottages, for the protection of my plantation, as well as for the reception of my work people.

The ground of this plot, whilst in a state of nature was covered over with ling, fern, broom and bad grass, and rushes in the wet places; the high parts of it very bad land, of a channelly quality, and not many inches from a grit-stone rock: lower down the hills, the land is of a better quality, affording a tolerable depth of soil, but was then very cold and swampy, for want of draining. The features of this inclosure are rather gentle than bold, inclining from the north and south down to a narrow valley in the middle, which continues from east to west, through the adjacent country; over which a small but petulant trout stream wantonly meandered in so many ridiculous mazes, as choaked its own progress, and rendered the whole of this small valley, containing about eleven acres of my best and most sheltered land, almost useless.

My first attention was applied to the conducting it through the ground in an easy curving line, filling up the many circumvolutions it had made in its former passage; after which, as several springs were contained within it, I laid stone conduits to conduct them off to the new watercourse; these were made nine inches deep within, six inches

wide, and laid one foot below the surface, that the trees which are planted upon them, might have room to vegetate.

I next proceeded to the paring and burning its rough and wild surface of rushes, &c. and to the levelling a great number of hillocks that had been thrown up by the water at the time of floods; after which, I trenched up the whole to the depth of eighteen inches keeping the ashes raised by burning to the depth of about six inches from the surface, that they might the better promote the vegetation of the young plants; and, having reserved about three acres for a nursery, which was stocked with a large quantity of young seedling trees purchased for the purpose, I planted the remainder, with the common basket ozier, and other aquaticks. The expense of the whole of this improvement, was considerable; but so much land may be truly said to have been made for ever, out of a mass of rudeness which yielded no profit to its owner. The new water-course formed an excellent conductor, not only to the stone drainage made in the valley itself, but also much aided my subsequent operations in the draining the sides of the hills, from which large currents of water were collected, and brought into the new cut; so that it has since answered in a double capacity.

In carefully examining the boggy parts of the rising grounds, I found the land of two different qualities, which appeared to be swampy from different causes. The first part which fell within my observation, and which contained the greatest quantity of land, was a light hazel earth mixed with stones, had an open grit stone-rock at the bottom, which lay at unequal depths from the surface; out of which issued many very strong springs, some of them making a very singular appearance above ground, from a kind of scum or moss that annually vegetated on the surface of the water; and which, in the course of time,

in some degree, dammed up the current, and, as it accumulated into a mass, carried up the water along with it, which constantly kept discharging itself out of the sides of these spungy quaking hillocks; many of which had arisen to a considerable height, and had often proved the graves of animals, as appeared from the many bones that were dug up whilst my people were cutting the drains. It was therefore evident that the bad condition of this part of the ground, was caused by springs only; these were easily taken off by digging at their head or source, down to that level where the water boiled up and formed one collected stream: from which my cuts were made, sufficient to contain a stone conduit, fifteen inches deep, and six inches wide, allowing the top of them to be one foot below the surface of the ground: all those conduits were directed down the sides of the rising grounds, in a direction north and south, to the new water-course, in the valley below.

The other kind of boggy land, the quality of which engaged my attention, appeared plainly to proceed from the toughness and tenacity of the ground, being a strong soil at the top, with a cold clay bottom; under which lay a close-bedded rock, whose interstices were also filled with clay. This kind of land seldom contains any springs, and none were found therein; it therefore became wet, from the rain water not being able to find its way through it. This turned out a much more difficult subject to improve, than the loose springy ground above described, as covered drains made with stones would have no effect; the only alternative left me, was, to make a number of small open drains, about two feet deep, one foot wide in the bottom, and two at the top, and to carry the same longitudinally along the ridges of the rising grounds; the better to intercept the water in its passage downwards,

and which I afterwards conducted to the new water-course, by some few general drains cut at right angles to the former ones.

Having completed the inclosing and draining my ground, my next business was the paring and burning about eighty acres more of the deepest land; and after the ashes were spread over the surface of it, I trenched the greatest part of it with the spade, to the depth of fifteen or eighteen inches; the rest was ploughed very deep: the latter I found the cheapest method, and nearly as efficacious as the former. I then began to plant, making choice of the autumn, for the high and barren parts; and the spring for the lower and deeper land. In the former situation, I chiefly confined myself to the planting the hardy natives of mountainous countries; such as the larch, pine, and fir kind, birch, geen-tree, and mountain ash, with some others; all which, for the sake of shelter, I planted at two feet asunder.

Upon the lower and more fertile ground, part of which was prepared as above described, I planted trees of a more permanent growth, most of which would produce a new succession from the root after cutting; such as the oak, ash, elm, sycamore, beech, and western plane; and in the moist ground, the alder, poplar, and Norfolk willow. These trees were planted at proper distances, to make a timber wood; and in the intermediate spaces, by way of shelter as well as profit, all the mountain kinds, as above mentioned, were introduced; most of which, except the larch and geen tree, are intended to be weeded out, after they arrive at a saleable age, to make room for the timber trees. In this part of the ground, the trees were planted at a yard distance.

It is well known that the resinous kinds, such as larch, pine, and fir, are more rapid in their growth, will grow

upon worse land, come to profit sooner, and afford more shelter than the generality of the other three; but it should be always considered, that they never spring again after cutting; so that in the course of a few years they arrive at maturity, must be cut down, and you have the melancholy prospect of being again presented with a dreary waste.

As I propose those kinds, the larch excepted, to remain for timber only, in the highest and most barren parts of my Plantations, that it may never come under so unpleasant a description, I have there, at proper distances, attentively planted amongst them some hardy kinds, which propagate themselves spontaneously from seed; such as the birch, mountain ash, and geen-tree, the seeds of which will be copiously sown and planted, by the winds and birds, which, nurtured by the fostering shade and warmth of the timber trees, will propagate themselves in every vacancy of the Plantation; and thereby replenish the naked ground when the resinous kinds are cut down and removed.

As I have long found from observation, that in unsheltered situations those trees thrive best, that are not above one foot or eighteen inches high when planted; as they furnish shorter levers than taller trees, which, by their own force, operating with the power of the winds, are constantly distressing the root, by breaking the young fibres, which destroys the progress of vegetation; to remedy which, it is common for inexperienced planters to place them so low in the earth as to be in a great measure out of the reach of the solar influence; a practice equally hurtful to vegetation as well as contrary to the mode in which nature plants her own productions: I therefore paid more regard to the strength of the stem and fibrous state of the roots, than to the height or age of

my trees, which were always planted very small, having few luxuriant weeds, or long grass to stifle or pull them down.

I chose also to intermix the different trees in my plantations, as much as possible; not only by way of establishing a succession in the manner before related; but also from an opinion, that ground so planted will produce more useful wood, and that the earth itself furnishes an heterogeneous mass of matter, containing the proper food for different plants to vegetate upon; and that every distinct species draws a peculiar kind of nourishment different from the rest; which is necessary for its own support.

If this opinion is well founded, a promiscuous arrangement of various kinds of trees, must be the best mode of disposing them; as each kind will with the more facility search out and obtain its share of proper nourishment, without robbing its neighbours; which being plants of a different genus, will partake of that aliment which is allotted for their succour. On the other hand, if trees of the same kind, and which draw from the earth the same specific nourishment, are planted very near each other upon the same common bed, they must soon exhaust the soil of that nutriment peculiar to their nature, and must dwindle of course.

I remember an experiment tried some years ago, by Mr. Jones, gardener to the Earl of Darlington, at Raby Castle, which I think throws some light upon this subject: He sowed peas, which is supposed to be rather a meliorating than an impoverishing crop, for ten years together, upon a piece of rich land: the result of this experiment was, that for the first two years the crop was abundant; but after that time, it gradually became more and more puny and meagre, so much so, that on the tenth year of

sowing, the earth was so drained of the proper nutriment this plant required, that the peas would not even vegetate within it, but lay till they became putrid; after which, without any previous manuring, he planted strawberries upon the same ground, which produced an excellent crop.

Some species of trees draw their nourishment very near the surface of the earth, and often form a compact web of roots above ground; others occupy the middle stratum; and some there are so hardy as to force their way, not only through the stubborn soil itself, but through stones, rocks, and minerals of all kinds, to the depth of twenty or thirty feet or more; which, without paying any respect to beauty, shows the utility of interspersing plantations with a variety of different trees, that each may have space, not only to find its proper pabulum, but to extend itself to that level it most delights in; and the whole body of soil and understratum, in this case, instead of being partially occupied, will probably furnish nutrition, and become one interwoven mass of roots and fibres, as far below the surface of the earth as the trees are elevated above it.

Having, in the course of about four years, completed all the above-mentioned works, I began to inclose my second purchase of three hundred acres, with a stone wall of the same dimensions as the former. I also added many convenient buildings to a farm-house which I found upon the spot; erecting several more cottages, both for the protection of my new plot, as well as to increase the number of my labouring people. After this, I proceeded to lay out, about my house, a small, but neat farm; which in a few years will be securely defended from the formidable winds of a naked country, by surrounding plantations of considerable extent.

This farm, as it may be considered the eye of my pro-

perty, was intended to afford an additional security to my woodlands; also that I might have a future opportunity of keeping some horses, to carry my wood to the neighbouring collieries, lead-mines, &c. as well as to furnish the little colony of cottagers, which I have planted and intend to plant upon my new settlement, with cow-pastures, potatoe-garths, gardens, orchards, &c. and also for the facility and pleasure of seeing and killing the game that are secured in the adjacent plantations, and for defending them from neighbouring depredations.

This small farm I subdivided into little fields, with quick-hedges, and trees planted within them; also with belts of wood for internal shelter. I next gave it a thorough draining, with such stone-drains as were made use of in the former plot; I then gave the whole a substantial, though rather expensive cultivation. This ground being nearly similar in quality to the first plot, with this difference only, that the declivities were fewer and rather more gentle, and the aspects not quite the same; I shall therefore not trouble you with the consequent alterations made in the mode of planting it, as they differed very immaterially from what I have before described.

Finding the orchards, in the county of Durham, had been as much neglected as the woodlands, and that there were but few apples to be purchased in that populous neighbourhood, except those that were imported at Newcastle, and other sea-ports; I thought it advisable to mark out some ground, for the purpose of planting apple and pear trees. I accordingly made choice of eleven acres, for that purpose, which have been since planted with all the best and most hardy kinds of winter and summer fruit, in a favoured situation, lying to the south, and embosomed by a large tract of new planted wood. I also made choice of and planted some similar situations,

upon a smaller scale, amounting in the whole to about fourteen or fifteen acres; which completed the improvements I had planned out for my second purchase, all which were performed in about four more years: the last two have been industriously occupied in replenishing my nursery for the extension of my intended plan of operations, and in renewing with living trees, the vacancies where the first planted ones had died, which were very numerous, from the losses occasioned by a series of bad seasons.

Great attention has also been paid to the eradicating such as did not appear to thrive on particular parts of the ground; and to the replacing them with such kinds as promised more success: this business has been attended to with such a vigilant eye by my fac-totum, at that place, that I believe, out of five hundred and twenty-seven acres, my small farm included, there is not a yard square of my whole ground but what is occupied by some useful or ornamental plant; there having been planted and replanted above four million of trees; amongst which, besides the profitable kinds that have been before mentioned, I hope my posterity will pardon (as an involuntary error in an admirer and student of nature) the foible of encumbering the ground with many thousand shrubs and plants, which can only furnish beauty to the eye of taste, and food to the feathered generation.

I have constantly paid an annual visit to my improvements in the county of Durham, ever since they began, until the last two years, I was prevented by the pursuit of my professional engagements. The last autumn, however, I had an opportunity of seeing them, on my road to Scotland. The trees in the first plot, being well rooted in the earth, had made very rapid shoots. I must acknowledge it gave me much pleasure to see so

large a surface of wood elevated some feet higher, since my last visit; and I rejoiced to see the sombre unprofitable heath for ever banished, by a gay succession of thriving trees, in their autumnal liveries, now sufficiently high to shelter the planter from inclement winds, and rising very fast into property and perfection. My plantations already begin to be an asylum for the game; the pheasants, hares, &c. from distant woods, have discovered a new retreat.

The trees in general flourish very well in both plots, particularly the larch, birch, geen-tree, Scotch fir, and mountain ash; amongst which the former distinguishes itself very much, being in all places considerably larger, and in some near twice the size of any other kind; and it appears also to afford a very salutary shade and shelter to those trees that partake of its influence. This convinces me of a great error I have committed, in planting Scotch firs, by way of nurses, which do not appear to answer the intended purpose of advancing the growth of the other trees; on the contrary, I find them great tyrants amongst their neighbours, from the strength and great extent of their branches; also from the close covert of the leaves, which not only exclude the air, but prevent a due admission of the rains.

The larch is not only superior in beauty and hardiness, but furnishes more durable and valuable timber; and is likewise a more tender and friendly nurse to more delicate trees, being furnished with a small number of small pliant branches well garnished with leaves; and which, from their flexible quality, will yield and give place to the adjacent trees, and are not subject to lash and buffet them: they also more readily admit the rains, than the Scotch fir, and are not liable to receive injury in snowy seasons, when the branches of the latter are

frequently mutilated, and the trees sometimes totally destroyed; the effects of which I have too fatally experienced.

I think it is probable other planters may have been often misled by a mistaken idea of the superior hardiness and nurturing quality of the fir: or, from not being acquainted with any other more proper tree to substitute in its place, have adopted it; or I should conceive, they would not have planted such numbers of this truly gloomy and unpleasant plant. In respect to shelter, it must be allowed to contribute in the winter more than most others, particularly the deciduous kinds; but as far as relates to the propagation of the plantations themselves, I am of opinion that internal shelter at this dreary season, when the powers of vegetation are totally locked up, is of much less consequence, than in the more genial months, when the trees are making their shoots; the internal warmth of a plantation must then greatly facilitate the operations of nature, and the larch, being one of the most early trees we have in the spring, is at that time in full foliage; and I consider it the most promising tree I have met with to aid her in that necessary work; and as I find it not easy to separate pecuniary gratifications from those of taste, notwithstanding my general dislike to the Scotch firs, I am not so much their enemy, as totally to exclude them from my plantations, as the sable hue produced by their foliage, has a good effect, when properly interspersed and blended with the more vivid tints of other more pleasing and lively trees: I shall, besides those that are intended to remain for timber on the barren parts, leave a number of them upon my best ground, for the purpose of decoration: the remainder I am now exterminating with all possible vigour.

The larch, I have found by experience, will thrive where few other plants will live. The birch, though no timber tree, is a useful wood, affords great shelter, and is almost as hardy as the larch, as I have fully proved at Butsfield plantations, which, in its uncultivated state, had several roads over it, some of which, that lead down the declivities of the hills, had all the soil washed from them by the torrents, nearly to the rock: those roads were planted with small trees of different kinds, making use of a pick-axe to form the holes for their reception: I also planted up all the old quarries, where stone had been got, in the same way. There being no soil, I brought a small portion of earth to each plant; and, upon those unfavourable spots, where most of the other trees had died, these plants appear to flourish as well as upon a better subject.

When I consider the many virtues of that invaluable and pleasing tree, the larch, I think it a great misfortune that its introduction into this country was not of an earlier date. About fifty years ago, I am told, this Alpine plant was treated as a tender exotic, and planted out, with the utmost care and dilligence, in our hot-beds and hot-houses; I am every day more convinced of its utility, both from domestic and foreign intelligence.

I must observe, that though there was not a single tree or bush upon either of my purchases, before I began the improvements, a circumstance soon after happened which convinced me that wood had grown upon the land; for, in digging my drains, the roots of large trees were found; also upon the surface of the ground, several very large heaps, containing the cinders of iron ore, which metal this country still produces: and it is probable the smelting it, may, in barbarous times, have been the original cause of the present scarcity of wood

in some of the northern counties; as there is a tradition prevails amongst the country people, that the whole of those waste lands was once a great forest; which was all consumed in smelting the ore, by a kind of foot-blast, before the invention of better engines; and that the workmen frequently shifted their ground, as the wood or ore decreased, till they had over-run the whole country.

I am making some experiments on the texture of the larch timber, that I may ascertain its quality for different untried purposes; the result of which I shall be happy to lay before the Society at some future opportunity; and if I can in any respect further their general plan, by a fuller and better explanation, so as to throw more light upon this useful science, which I humbly conceive has not yet been explored to its fullest latitude in this country, I shall think myself highly gratified, not only in promoting a work which has so warmly and unremittingly excited my ardour and attention for many years, but shall also think myself much flattered in having the honour to correspond with a Society of gentlemen of such distinguished liberality and ingenuity.

I am, Sir,
&c. &c. &c.
THOMAS WHITE.

Mr. More,
Secretary, &c. &c.

N°. II.

GROWTH OF TURNIPS.

The following Experiments and Observations on the CULTURE *of* TURNIPS, *were communicated to the Society, by* GEORGE WINTER, *of Charlton, near Bristol, Esq. and Thanks were returned to him for the same. The Drawing or Model of the Drill, mentioned in Mr. Winter's second Letter, has not yet been received; a particular Description of it must therefore be deferred till the Publication of some future Volume of these Transactions.*

Charlton, near Bristol,
July 7th 1786.

SIR,

THE very numerous experiments I have repeatedly made, more particularly this summer, on turnip seed, to prevent being destroyed by the fly, enables me to send you my first account, and recipe, for the most effectual preservation of that excellent vegetable.

My turnips have already been inspected by many gentlemen in this neighbourhood. Should a member of your Society live near this place, he may examine my numerous experiments, which, if your Society should deem worthy their perusal, I will send you an account of the whole, with the particulars of my observations on each.

As I have been credibly informed that turnips have this season been sowed three times on the same ground, as the season is so far advanced, I think no time should be lost in serving the community.

Your answer by return of post, will be esteemed a favour conferred on,

Sir,

Mr. More, &c. &c. &c.

Secretary, &c. &c. GEORGE WINTER.

P. S. Steep turnip seed, twenty-four hours or more, in a sufficient quantity of train oil. Take a fine sieve, or linen bag, drain the oil from the seed, which mix with a quantity of good earth, finely sifted; immediately drill or sow. When the plants begin to appear on the surface, let the ground be sowed with soot, from eight to sixteen bushels per acre.

N. B. Linseed, or other good vegetable oil, is equally as efficacious: and, by draining the oil, a small quantity will be effectual for a large quantity of seed—the remainder will serve for common use, such as for harness, &c.

This mode is equally beneficial for every kind of grain, or seed sown in the garden. Time will not permit me at present to state my philosophical reasons on the subject.

Upwards of one hundred gentlemen and farmers have examined my crops of grain and carrots planted by my machine, which crops are allowed to be far superior to any in this country.

The superior advantages of drilling, are great and many. When the seed is deposited at an inch and a half, or not exceeding two inches deep, it immediately attracts moisture from the under strata. A proper ma-

chine, with a harrow fixed to it, will sufficiently cover the seed, requires no further harrowing, rolling, nor bushing. By this mode, the soil will be so loose and porous, as readily to admit the dews and influence of the atmosphere, by which the tender roots and fibres will freely extend themselves for nourishment. By the common mode of raising turnips, the seed is sowed broadcast; the scorching sun often injures it before it can be covered; the treading of the horses by harrowing, bushing, and rolling, so hardens a loamy or stiff soil, as entirely to exclude the air, dews, &c. and prevent the seed from vegetating.—Such are the effects of common agriculture, not only on turnips, but every other kind of seed, and all sorts of grain; near half is buried and destroyed by the pressure of the horses feet, improper dragging, rolling, &c. which I am surprised has never hitherto been noticed by any agriculturist. Repeated observations and experiments have fully convinced me of such a mode being extremely erroneous. At present, I can only observe, that if the Society should esteem my observations and experiments thereon worthy their attention, I will with much pleasure convey them, as time may permit.

Charlton,
SIR, Oct. 11, 1786.

PERMIT me to acknowledge the receipt of your favour, and to inform you, that gentlemen who have seen Mr. Cooke's and my machines, assure me that mine is far superior to his or any other yet invented.—It is so strong, that nothing but the greatest violence can possibly injure it.—It has been tried on the stiffest ground with open drains fifteen inches wide, and twenty inches deep, which must have broke to pieces any instrument of less strength than mine, and executed extremely well

without receiving the least hurt.—Mine has nothing complex in its construction, is governed by one movement only, and in a few minutes is fully understood by any person of the meanest capacity.—By a close attention to its executive powers I have lately made more improvements, and am now fully convinced that it is complete.

I will furnish you with a model or drawing as soon as possible; and I will not hesitate to say, that the drill husbandry must in a very short time, become general, on land where large stones cannot obstruct.

I beg leave to present you with the particulars of my experiments on turnips, which I wish may be acceptable to the Society;

And am, Sir,
&c. &c. &c.
GEORGE WINTER.

Experiments on early Dutch turnip-seed, sowed on beds in my kitchen garden, in drills twelve inches distant, and one inch and a half deep, on the 11th of May, 1786. These beds had been manured with rotten dung, in 1785 —After planted with cabbages.

Remarks made the 26th of June.

Stake.

No. 1 Seed without any preparation—No. 4, or 4th best.
2 —— mixed with soot, 3rd.
3 —— with barton draining, 4th.
4 —— out of dunghill, 2nd.
5 —— stale human urine, very few plants appeared.
6 —— lime and barton draining, none vegetate.
7 —— soot and water, 2nd.
8 —— soot and barton draining, 2nd.
9 —— elder-leaf juice, 3rd.

Stake.

No. 10 Seed mixed with elder and barton draining, 2nd.
11 —— and soot sowed over the covered drills, 3rd.
12 —— and lime sowed over ditto, 3rd.
13 —— mixed with slacked lime, very few plants appeared.
14 —— sowed, scattered soot over, then covered, 3rd.
15 —— ditto, slacked lime over ditto, very few plants appeared.
16 —— Elder bush drawn over when the plants appeared, 4th.
17 —— steeped in train oil, flourished extremely, 1st.
18 —— in linseed oil, rather inferior.

The linseed oil was taken out of a bottle that had contained oil of turpentine for painters' use.

N. B. All the seeds were steeped six hours in the different compositions.

Experiments on Turnips (green Norfolk) drilled one inch and a half deep, at one foot distance in the rows, on beds eight feet three inches long, and two feet wide.—Weight of seed, half a drachm to each bed, mixed and steeped with sundry articles as under, to endeavour to ascertain the most effectual remedy for preventing the fly: drilled on unmanured ground, the 20th of June, 1786. Marked with stakes.

Stake.

No. 1 Seed mixed with half an ounce of dry soot, then mixed with a pint of sifted mould, and drilled.
2 —— Soaper's ashes, ditto.
3 —— Wood ashes, ditto.
4 —— Pounded gunpowder.

Stake.

No. 5 Seed mixed with brimstone.

6 —— Slacked lime.

7 —— steeped six hours in soot, and a quarter of an ounce of train oil mixed with a pint of sifted mould.

8 —— steeped in soaper's ashes, and ditto.

9 —— Wood ashes.

10 —— Gunpowder pounded.

11 —— Brimstone.

12 —— Slacked lime.

13 —— steeped six hours in soot, and a quarter of an ounce of linseed oil, mixed with a pint of sifted mould.

14 —— Soaper's ashes, and ditto.

15 —— Wood ashes.

16 —— Gunpowder pounded.

17 —— Brimstone.

18 —— Slacked lime.

19 —— mixed with brimstone, and salt petre pounded, mixed with a pint of sifted mould

20 —— steeped six hours with ditto, and a quarter of an ounce of linseed oil, ditto.

21 —— steeped six hours with ditto, ditto train oil ditto.

22 —— steeped six hours with brimstone, and barton draining, mixed with mould.

23 —— with linseed oil.

24 —— with train oil.

25 —— drilled in, and covered, after sowed soot over the beds.

26 —— Soaper's ashes.

27 —— Wood ashes.

28 —— Slacked lime.

Stake.

No. 29 Seed steeped six hours in linseed oil, mixed with mould, and covered; then sowed soot over the beds.

30 —— in train oil, ditto, ditto.

July 17, 1786. Particularly examined all the beds. None had entirely escaped the fly.—The least injury was done to No. 30, 29, 24, and 23, which grew so luxuriant, as to produce rough leaves several days prior to the most flourishing of any other number, and enabled them the sooner and better to withstand the fly's attack.—The linseed oil was the same as that used in the first experiment.—Its effects were inferior to train oil, which I must impute to the drying properties of the turpentine. The leaves of the seeds steeped in oil, were of a much darker green, and appeared twice as thick in bulk and luxuriancy; and the plants were a considerable deal larger than any of the other numbers.—In point of luxuriancy, &c. they stand as under.

No. 30, 29: 1st best: Longest before, and least touched with the fly, which I, in some degree, impute to the soot scattered over the beds.

24, 23—2nd best.

3, 5, 11, 17, 22, 25, 26, 27, 4th best.

7, 13, 19, 5th best.

All the others far inferior to even No. 5.

Other experiments tried since, in July and August, which cannot at present insert.

N° III.

CULTIVATION OF THE RACINE DE DISETTE.

The Thanks of the Society were returned to THOMAS BOOTHBY PARKYNS, *Esq. for the following Letter on the Culture and Uses of the Plant called* RACINE DE DISETTE, *and to Sir* RICHARD JEBB, *Bart. for his care in transmitting to the Society, the seeds mentioned therein.*

[*These Seeds were distributed to several of the Members of the Society; the plants produced from them flourished well, and are evidently a kind of beet; but being sown at too late a season, did not arrive at that magnitude which might have been expected from the account given of them. Further experiments are however now making, the result of which will furnish an Article in some future Volume of these Transactions.*]

Metz, May 13, 1786.

SIR;

I HAVE this instant received Sir Richard Jebb's letter concerning the *Racine de Disette*, and send, in consequence, a parcel of the seed, which the Society will honour me by accepting.—I am obliged to send it to the warehouse immediately, as the Diligence by which it is

to go, sets off to Paris in a few hours—I have therefore no time to translate, or transcribe the full directions given by the person who introduced it first into this country, for the cultivation of the *Racine de Disette*; nor to describe its various and profitable uses. I shall content myself, as no time ought to be lost, and that I may not let this opportunity slip, it being now full late to sow the seed, with saying that the seed should be sown in the garden, or very good ground, in rows, or broad cast, and as soon as the plants are of the size of a goose-quill, they should be transplanted in rows of eighteen inches distance and eighteen inches apart, one plant from the other: care must be taken in the sowing, to sow very thin, and to cover the seed, which lies in the ground about a month, an inch only. In transplanting, the root is not to be shortened, but the leaves cut at the top; the plant is then to be planted with a setting-stick, so that the upper part of the root shall appear about half an inch out of the ground; this last precaution is very necessary to be attended to. These plants will strike root in twenty-four hours: and a man a little accustomed to planting, will plant with ease one thousand eight hundred, or two thousand a day. In the seed-bed, the plants, like all others, must be kept clear of weeds: when they are planted out, after once hoeing, they will take care of themselves, and suffocate every kind of weed near them.

The best time to sow the seed is from the beginning of March, to the middle of April; the cultivator, however, advises to continue sowing every month until the beginning of July, to have a succession of plants. The seed will get to England six weeks or two months too late: of course, the leaves will not produce so much green forage, nor will the roots be so large by five or six pounds weight, as if they had been sown at the proper season.

I shall only add, for the present, that both leaves and roots are most excellent both for man and beast. This plant is not liable, like the turnip, to be destroyed by insects, for no insect touches it; nor is it affected by excessive drought, or the changes of seasons. Horned cattle, horses, pigs, and poultry, are exceedingly fond of it, when cut small. The leaves may be gathered every twelve or fifteen days; they are from thirty to forty inches long, by twenty-two to twenty-five inches broad. This exfoliation, which is properly explained by the cultivator, assists the increase of the root instead of destroying it, as it does that of the beet-root, which it resembles very much, both in the seed and leaves. This plant is excellent for milch cows, when given to them in proper proportions, as it adds much to the quality as well as quantity of their milk; but care must be taken to proportion the leaves with other green food; otherwise it would abate the milk, and fatten them too much, it is of so exceeding a fattening quality.

I have taken steps for my receiving in England, any quantity of the seed I may want; a precaution very necessary, because this plant, like the cabbage, must be planted in the spring, for seed; so that the plants of this year 1786, will not produce seed time enough for the year 1787.

I intend being in England the first or second week in August, and shall be happy to communicate the full directions for the cultivation of this excellent plant, that will be full time enough for every purpose the Society can wish in the further culture of the Racine de Disette.

I am, Sir,

Mr. More, &c. &c. &c.

Secretary, &c. &c. T. B. PARKYNS.

P. S. I intend sending another parcel of this seed the first opportunity, for fear this may miscarry. Sir R. Jebb will present the seed to the Society.

N° IV.

DESTROYING INSECTS IN HOT HOUSES.

An easy Method of destroying the RED SPIDER, *and other noxious insects, in Hot-houses and Pinerys, has long been considered as a very desirable object both to gentlemen and gardeners; and various modes of fumigating such places have been proposed, and premiums paid by the Society, for that purpose; particularly to Mr.* GREEN, *of Her Majesty's Flower-Garden at Kew, for his invention of a kind of Bellows, contrived by him, and now much in request, and commonly sold in the shops, by which the fumes of burning Tobacco, put into a cavity made in the nozzle of the Bellows, are blown into the places infected.—The following letter from Mr.* AILWAY *contains a method to obtain the same end—but it is hardly necessary to add, when the nature and properties of White Sublimate are considered, that the washing the frames and walls must be done with great care and caution.*

SIR;

As the Society have sufficiently expressed their desire of finding a method of destroying the Red Spider, by having proposed a premium for that purpose, I send them

an account of an attempt to answer that end; made in the hot-house of Thomas Clutterbuck, jun. of Watford, Herts, Esq.

Last summer, this house being much infested with the red spider, I prepared pieces of match, about six inches long; the pieces were moistened on the outside with a tincture of assafœtida, in spirits of wine, and then rolled in a powder, equal parts of brimstone and Scotch snuff; the gardener was directed to light the pieces, and by means of wires, or other contrivances, place them as near the ground as he could, and behind the frames, &c. at night, and then shut up the house close. The event was, many were destroyed or disappeared, and very little inconvenience was suffered from them, the rest of the year.

Sometime last winter, I directed the walls of the house, frames &c. to be well washed with the following: take sublimate four ounces, and dissolve it in two gallons of water. This hot-house was likewise greatly infested with ants, not much less troublesome than the spider; neither spider nor ants have been seen in this house all this summer. If this method proves effectual, on farther trial, the Society's wishes will be gratified, I hope, to the utmost, as the remedy is cheap and easily applied.

This wash may be used on old garden walls, and to the roots of trees infested with ants, if made weaker: the experiments I have made, prove that it will destroy the tender leaves of some plants, though not the roots. One pint and a half, poured four months ago on a standard currant tree, as near the stem as I could, has not affected either the leaves or tree itself, as far as I can perceive at this time. That this wash will be effectual in the destruction of all insects of a tender cuticle, and the ova of most others, I am myself perfectly convinced, and also that it will effectually destroy the spider. I recommend to every gentle-

man inclined to make the trial, to take care that it be applied with diligence into every crevice of the walls, frames, &c. with a painter's brush.

I am, Sir,

Mr. More,
Secretary, &c. &c.

&c. &c. &c.
JOHN AILWAY.

N° V.

CHAFF-CUTTER.

Description of a MACHINE FOR CUTTING CHAFF, *made and invented by* JAMES PIKE, *Watch-maker, of Newton Abbot, Devonshire.*

The advantages of an easy and commodious method of cutting Straw, for the feeding horses, by such an Engine as could be used by common labourers, have been long acknowledged; and some bounties have been formerly paid by the Society, for attempts to bring such an Engine to perfection; but the chief objection has hitherto been, the great price at which they were necessarily sold.

The following letters, and the annexed plate, with the description of an Engine of a simple and cheap construction, invented for this purpose, by Mr. JAMES PIKE, *Watch-maker, of Newton Abbot, in Devonshire, to whom a bounty of twenty guineas was given, will sufficiently and readily point out to any workman, the na-*

ture and principles of his Machine, one of which is reserved in the Society's repository, for the inspection of the public.

Newton Abbot, Devon,
SIR; Jan. 20, 1786.

I HAVE invented an engine for cutting chaff, on an entire new principle from what was ever, as yet, introduced to the public, and have accordingly written to several people to get proper directions to your Society; but could not be informed, until luckily I met with a Mr. Pepperell, of Totness, who received a reward from your Society, for inventing a straw or chip hat, who gave me the address to you, which induced me to take this liberty.

The chaff cutter is an Engine of old standing; for one sort, I hear there is a patent, which I never saw—I have seen two engines for the purpose, at James Templer's, Esq. at Stover Lodge, in our neighbourhood, made by Mr. Sharp, of London, at twelve guineas each: their complicated construction, the noise they made in working, and their high price, gave me a general dislike to them; and I have, by a steady perseverance, I think, brought one to perfection; it does its work more speedily and easy, and is not only original, but simplicity itself: it will cut twenty-two bushels per hour, and makes no more noise than is caused by the knife passing through the chaff, and its price will not be one-half that of Mr. Templer's. This gentleman, the instant he saw mine, was so pleased with its construction, that, notwithstanding he had these two valuable ones already, he ordered one of me.

It has been examined by several of our most respectable gentlemen, viz. Sir James Wright, Sir Robert Palk, Sir Thomas Carew, John Cholwich, Esq. and Colonel

Grenfield, of the horse-guards, in London; who have all expressed their approbation, and say it surpasses all they ever saw, both in its simplicity and dispatch of work. The former gentleman strongly persuades me to have a patent for it, to secure the sale to myself, as he does not think it otherwise possible for me to be paid as I ought; for as soon as it appears to the eyes of the workmen, it will be taken from me, and others will reap the advantage of my invention: but as I have a large family, and nothing but my own hands to earn a maintenance, I cannot think of taking out a patent.

I hope that any informality in the manner I have taken, will be overlooked. I am prompt to ask your advice, how I shall conduct myself so as to benefit my family, as well as the community in general? An answer by the return of post, with your advice, whether you think it worth my coming up with it, will be a favour gratefully acknowledged,

I am, Sir,
&c. &c. &c.
JAMES PIKE.

The engine is fixed on a wood frame, which is supported by four legs; and on this frame, is a box for containing the straw, four feet six inches long, and about ten inches broad; at one end, are fixed across the box, two rollers inlaid with iron, in a diagonal line about an eighth of an inch above the surface; on the ends of these rollers are fixed two strong brass wheels, which take one into the other. On one of these wheels, is a contrect wheel, whose teeth take into a worm on a large arbour; on the end of this arbour, is fixed a wooden wheel, two feet five

inches diameter, and three inches thick; on the inside part of this wheel, is fixed a knife, and, every revolution of the wheel, the knife passes before the end of the box and cuts the chaff, which is brought forward between the rollers, which are about two inches and a half asunder; the straw is brought on by the worm taking one tooth of the wheel every round of the knife; the straw being so hard pressed between the rollers, the knife cuts off the chaff with such ease, that twenty two bushels can be cut within the hour.

A. The box, into which the straw is put.

B. The upper roller, with its diagonal projecting ribs of iron, the whole moving by the revolution of the brass wheel C. on the axis of which it is fixed.

D. A brass wheel, having upon it a face wheel, whose teeth take into the endless screw on the arbour E. while the teeth on the edge of this wheel, enter between those on the edge of the wheel C.

On the axis of the wheel D. is a roller with iron ribs similar to B. but hid within the box.

E. The arbour, one of the ends of which being made square and passing through a mortise in the centre of the wooden wheel F. is fastened by a strong screw and nut; the other end of this arbour moves round in a hole within the wooden block G.

H. The knife, made fast by screws to the wooden wheel F. and kept at the distance of nearly three quarters of an inch from it by means of a strip of wood of that thickness, of the form of the blade, and reaching to within an inch of the edge.

I. The handle mortised into the outside of the wooden wheel F.

N° VI.

SOWING AND DRILLING MACHINES.

[*Among the Presents received by the Society, in the Year* 1786, *were two Machines, the one named the New-invented Patent Universal Sowing Machine, by Mr. John Horn, of Dover, Kent; the other called a Patent Drill Machine, invented by the Reverend James Cooke, of Heaton-Norris, near Manchester, with which also was received a New-constructed Hand-Hoe, invented by the same gentleman. As patents were granted for each of these Machines, the Society, consistently with their Rules and Orders, could take no farther notice of them than to return thanks to the inventors for the presents; and as full descriptions of the Machines have been already several times printed, the public are sufficiently possessed of the knowledge of their different constructions. The Machines at large are reserved in the Society's repository.*

No accounts have hitherto been received of any experiments made with Mr. Horn's Machine; but of that invented by Mr. Cooke great use has been made in different parts of the Kingdom; with what success, will appear from the perusal of the following letters: and as a full investigation of the comparative advantages of the Drill and Broad-cast Husbandry, has long been a subject of attention, both to the public at large, and

the Society, it is presumed the following communications will tend to elucidate that matter.

The Society has been favoured with several other accounts of the advantages arising from the use of the Drill mentioned in the following papers; but the two annexed letters are judged sufficient for the present publication; and thanks were returned to Mr. Malcolm, and Mr. Boote, for the judicious observations and accurate accounts of the experiments contained therein.]

Kennington Nursery, Surry,

DEAR SIR; Dec. 22, 1786.

I BEG the favour of you to lay before our honourable Society, an experiment on a small scale, of the comparative difference between the broad-cast and drill husbandry, which I think deserves to be made known.

The land on which the oats were sown had been dunged the year before, and a crop of garden beans and turnips produced thereon; about the end of February the ground was ploughed, and lay in furrows until the 24th of March, 1786, on which day it was harrowed, and the ground sown. I beg leave here to observe, that when the land was ploughed, which is only two acres, I had no intention to try any experiment on it, or I would have divided the lands equally. It was ploughed in three ridges or lands, agreeable to the inclosed plan, No. 1, 2, 3. I made choice of No. 2. being the middle piece, for sowing broad-cast; that no exception might be taken as to the quality of the land. I began with the drill machine on No. 1. which, for want of practice, took up one hour and half; then No. 2. broad-cast, which we sowed and harrowed in forty-five minutes: then No. 3. took up an hour and half. The whole crop came up very well, but the drill appeared

much the most regular, stronger, and of a more verdant colour.

On the 17th of May, I set two men to hoe the drilled crop, both experienced in hoeing every sort of crops, the one with Mr. Cooke's hoe, the other with the common one. Cooke's hoed one fourth more ground in the same time than the common one; but the man said, it was much harder work. I paid them at the rate of three-shillings per acre; nor did I perceive any material difference in the performance, both were very clean, and became the admiration of every passenger.

On the 27th and 28th of July, the whole was reaped, and in a few days was housed without any rain; each, parcel was thrashed separate, and the contents of each were agreeable to the plan.

If after upwards of forty years experience in agriculture, and an acquaintance with every machine that has been tried before this honourable Society, I may be permitted to give an unbiassed opinion on this experiment, it would be greatly in favour of drill husbandry, and particularly of Cooke's machine, it being the only one I have ever seen that deposits the grain of an equal depth, delivers evenly, and covers it properly. Any grain thus treated has an indisputable advantage over the broad-cast, even in land that is fine; but the difference must be very great in land whose surface is uneven and rough: in the one, the grain is very partially covered, and consequently comes up at different times, and hence the crop is of an uneven height, and unequal as to ripening as well as to the size of the grain; on the contrary, those that are drilled come up at the same time, keep equal pace, and all ripen together, are clean, free from weeds and grass, and require much less time to dry the sheaf, and the operation of thrashing is of course much sooner performed; besides the oppor-

tunity it gives farmers to clean their ground, that is either foul with weeds or grass.

I also sowed garden cress and mustard, with the machine; and although the smallest cups were much too large, and deposited more seed than was necessary, yet the produce was nearly double I ever had from broad-cast. In the year 1785, I lost the crop of eight acres of oats, and two acres of cress and mustard, in broad-cast, which, had they been drilled, I am satisfied would have produced a good crop.

If the foregoing observations should tend in any degree to further the designs of the Society, with regard to drill husbandry, particularly with respect to the machine invented by that ingenious man, Mr. Cooke, my end will be fully answered; and any other information the Society may require at any time, will with great pleasure be communicated.

I am, Sir,

Mr. More, &c. &c. &c.

Secretary, &c. &c. Wm. Malcolm.

No. 1. Drilled. Contents 80 rods.—Sowed 1 bushel and half.—Produce 35 bushels.

No. 2. Broad-cast. Contents 80 rods.—Sowed 2 bushels and half.—Produce 31 bushels.

No. 3. Drilled. Contents 1 acre.—Sowed 2 bushels and quarter.—Produce 74 bushels.

Atherston upon Stour, near Stratford upon Avon,

GENTLEMEN; Warwickshire, Dec. 9, 1786.

The encouragement held out by your very laudable Society for the Encouraging of Arts, Manufactures, and Commerce, for various improvements, induces me to

submit to your candid consideration, the following circumstances in agriculture.

For several years past I have made use of the common single drill, for beans, which has been productive of an uniform superiority in a comparative view with broad-cast.

In the year 1784, I was disposed to make an experiment in drilling wheat; when a servant of the Rev. Mr. Cooke, of Heaton-Norris, near Manchester, happened accidentaliy to pass by on the road, by the side of my land, with one of the said Mr. Cooke's new-invented drill machines. I requested him to make an experiment, which he did upon a land, or ridge; the adjoining land of equal size I had drilled with a single drill, and the remainder of the field sown broad-cast. At harvest, there was a decided superiority in favour of the land drilled with Mr. Cooke's machine. In particular it had this advantage over the single drill, that the seed was not buried, nor crushed in the delivery, the distribution more regular, and the depth more certain.

This machine at first sight, appeared to be rather complex and difficult to use; but on its being set to work, and its construction more maturely considered, I soon found it to be the very reverse. The depth that seed should be deposited in the land, I have found, by experience, to be of the utmost consequence to all crops of corn. In this instance, the construction of the machine has singular merit; for whether it is at work upon a level, or upon rising, or falling ground, or on a side slip, the depth that seed should be deposited, is readily fixed, even in soils of different textures, and that by common husbandmen, of which I have had ample proof from my own servants. The delivery of the seed, and regularity of the distribution, are not less curious than they are

simple and certain. In the former instance, the seed is in no danger of being bruised or crushed; in the latter, the quantity per acre, is buried at pleasure.

In this light, the machine appeared to me on first seeing it set to work; and that I was not wrong in my conceptions of it, my experiments upon a large scale, since that time, have exhibited undoubted testimony to all my neighbours, and several hundreds of gentlemen, and respectable farmers, who came from far to view my crops.

At wheat seed-time in 1785, having purchased a machine, I drilled eighty acres with wheat, the promising appearance of which, in the spring of 1786, encouraged me to drill all my barley, being one hundred and twenty acres; also sixty acres of beans, twenty acres of Peas, twenty-eight acres of oats, and sixty acres of turnips; in all, three hundred and sixty-eight acres. The result of the above experiments I have inclosed, having ascertained them with the greatest accuracy, by reaping and thrashing separately, the produce of one land or ridge of each crop, in a fair average part of each field, except the oats and turnips: the former were inadvertently omitted to be ascertained; the latter were mostly destroyed by the fly, as well as those that were sown broad-cast.

During the sowing of the above crops, an accurate account was taken of the quantity of seed that was expended; which being compared with the quantity that is commonly sown broad-cast, I found that I had saved upwards of one hundred and fifty pounds in the article of seed, every shilling of which it was my intention to have laid out in hoeing the above crops, but the season for hoeing was too short to admit of it. Notwithstanding which, by a strenuous and active exertion, I had most

of my drilled crops well hoed ; an accurate estimate of which, I could not conveniently take, having, at one and the same time, not less than one hundred men, women, and children, employed in hoeing. But from the best calculation I can make, each hoeing will cost upon an average, from one shilling and threepence to one shilling and sixpence per acre, with a hoe invented by the said Mr. Cooke : but, supposing the expense of hoeing, and cleaning the land from weeds, to be something more than I have stated, and supposing the advantages of drilling to be as great, or greater than any one would imagine, I am perfectly satisfied that the advantages of hoeing are, upon the whole, superior to those of drilling; having reason to believe from the cleanness of my land, that where I shall have one weed in my next crop, I should have had thousands from the seeds of the weeds of my last crop, if I had not cut them up in their infancy by the hoe. But to exhibit in a clear light, the full advantages of hoeing, I presume recourse must be had to a number of experiments to be made upon the same land, for a number of years successively. This to be put in practice, by drilling and hoeing next year, the same land as was drilled and hoed this year, and by sowing broad-cast next year, the same land which was sown broad-cast this year ; continuing the same practice for four, five, or six years successively ; at the expiration of which time, I have reason to believe, that the land which has been drilled and hoed as above, will produce a tolerable crop, and the land which has been sown broad-cast with common weeding only, will produce little else but a fleece of weeds. If the result of this experiment shall favour my expectations, I shall bid adieu to summer fallow, which indeed I have nearly done already, by carefully avoiding to take two exhausting

crops together, and as carefully studying to take an exhausting and an ameliorating crop alternately.

I have thus impartially represented to you the effects of the said Mr. Cooke's well-constructed drill machine, on three hundred and sixty-eight acres, which is more than I ever heard of being drilled by one person in one year.

I am, Sir,
&c. &c. &c.
JOHN BOOTE.

N. B. I have now growing one hundred and twenty acres of drilled wheat, of a very promising appearance.

Account of the different Sorts of Grain, produced from Seed sown by the Rev. Mr. COOKE's *Patent Drill, on the Estate of Mr.* JOHN BOOTE, *of Atherston, near Stratford upon Avon, in the county of Warwick, in the year* 1786.

	Land measured.			Produced.			Produce. per Acre.		
	A.	R.	P.	Bush.	G.	Pts.	Bush.	G.	Pts.
No. 1. Wheat growing upon a loamy sand after beans	0	1	31	20	6	7	47	0	0
2. Wheat growing upon cold clay after beans	0	1	29	19	2	1	44	5	4
3. Wheat growing upon cold clay after beans	0	2	22	16	2	2	25	4	2
* 4. Wheat sowed broad-cast in the ground after beans	0	2	4	5	0	1	9	4	4
5. Peas growing on light sand after barley	0	1	23	19	6	2	50	2	1
6. Barley growing on light sand after turnips	0	2	31	53	1	1	72	4	1
7. Beans growing on loamy sand after barley	0	2	4	19	0	5	36	2	4

The above account was surveyed, and the workmen examined by me, JOHN TOWNSEND.

* Of an inferior quality.

[*The great and striking difference in the crops No.* 3, *and* 4. *occasioned the Committee of Agriculture, to whose consideration the several accounts were referred, to order a letter to be written to Mr. Boote, requesting him to inform the Committee, what he thought occasioned the very great difference in the two experiments, No.* 3, *and* 4, *as they seem to have been made on the same soil; and whether there are any other causes than the one having been sown broad-cast, and the other drilled. In answer to this enquiry, the following letter was received from Mr. Boote.*]

Atherston upon Stour,
Jan. 26, 1787.

SIR;

No. 3, and 4. is one field, about thirty acres, part of a farm I have occupied from Michaelmas, 1783, and has from that time been cultivated and managed alike, taking an exhausting and an ameliorating crop, alternately. The part sown broad-cast, with two bushels and half of seed to the acre, which was the customary quantity, had a much better appearance than the drilled, until the first and second hoeing had taken place in the spring: another reason is, I think the broad-cast was over-burdened with seed, at an improper depth. The plants not having sufficient room to thrive, which was apparently the reverse with the drilled. I hope the above will prove satisfactory to the committee.

I am, Sir,

&c. &c. &c:

JOHN BOOTE.

PAPERS

IN

CHEMISTRY.

N° I.

STONE RETORTS.

A Method for preventing STONE RETORTS *from breaking; or stopping them when cracked, during any Chemical Operation, without losing any of the contained Subject.*

[*PERSONS employed in performing chemical operations, whether on the large scale of business, or as experiments only, will readily see the benefit that must accrue to them, from the knowledge of an easy, cheap, and expeditious mode of stopping any cracks that happen, during a process, in the earthen vessels employed in strong fires. The following paper, which is the result of many years experience, and has been confirmed by trials in different laboratories, will therefore prove highly acceptable to all employed in chemical pursuits; for the composition therein mentioned, has been tried on crucibles employed in melting metals, and has been found to succeed. The*

losses frequently sustained by workmen, by the cracking of those vessels while the metals within them are in a fluid state, render the discovery of a method of preventing such accidents of great consequence in many of our valuable manufactures.]

The Thanks of the Society were given to Mr. WILLIS, *for the following Letter and Paper on this interesting subject.*

Hermitage, Wapping,
April 28, 1786.

GENTLEMEN;

As you have long been the patronizers of merit and industry; give me leave to offer to your consideration, a successful method of preventing Stone Retorts from breaking, during any operations in the fire, or stopping them instantaneously when cracked, even in the strongest heat.

As I imagine it may be of great utility to speculative, as well as practical chemists; I submit it to your opinion whether you think it worthy publication.

I am,
&c. &c. &c.
THOMAS WILLIS.

I HAVE always found it necessary to use a previous coating for filling up the interstices of the earth or stone, which is made by dissolving two ounces of borax in a pint of boiling water, and adding to the solution as much slacked lime as will make it into a thin paste: this, with a common painter's brush, may be spread over

several retorts, which, when dry, are then ready for the proper preserving coating.

The intention of this first coating is, that the substances thus spread over, readily vitrifying in the fire, prevent any of the distilling matters from pervading the retort; but does in no wise prevent it from cracking.

Whenever I want to use any of the above coated retorts after I have charged them with the substance to be distilled, I prepare a thin paste, made with common linseed oil and slacked lime well mixed, and perfectly plastic, that it may be easily spread: with this let the retorts be covered all over, except that part of the neck which is to be inserted into the receiver; this is readily done with a painter's brush: the coating will be sufficiently dry in a day or two, and they will then be fit for use.

With this coating, I have for several years worked my stone retorts, without any danger of their breaking, and have frequently used the same retort four or five times; observing particularly to coat it over with the last-mentioned composition every time it is charged with fresh materials. Before I made use of this expedient, it was an even chance, in conducting operations in stone and earthen retorts, whether they did not crack every time; by which means great loss has been sustained.

If at any time during the operation, the retorts should crack: spread some of the oil composition thick on the part, and sprinkle some powder of slacked lime on it, and it immediately stops the fissure, and prevents any of the distilling matter from pervading; even that subtle penetrating substance phosphorus will not penetrate through it. It may be applied without any danger, even when the retort is red hot; and when it is made a little stiffer, is more proper for luting vessels than any

other I have ever tried; because, if properly mixed, it will never crack; nor will it indurate so as to endanger the breaking the necks of the vessels, when taken off.

As the above method of preserving retorts may be of singular service to philosophical chemists, as well as those who practice the science for commercial purposes; it is my wish it should be generally known; as many curious operations may be carried on with greater safety, and at an easier expense. I have communicated it to the Duke de Chaulnes, who no doubt will make it known to the French chemists; and shall be happy to hear of its being of advantage to a science so much cultivated in the present age.

PAPERS

IN

POLITE ARTS.

N° I.

PAINTING IN WAX.

[*THE well-known disadvantages that paintings in oil lie under, have rendered the discovery of some other vehicle an object of attentive inquiry among the learned; and dissertations have been written on the subject by various authors, as Count Caylus, Muntz, &c. &c. Wax has been universally considered as the most likely substance to supply the place of the oil, and most writers have recommended the uniting it with alkaline salts into a kind of soap for that purpose: the impropriety of such a measure, is evident to any one, in the least acquainted with the properties of those salts.— The method made use of by Miss Greenland, provides against all those inconveniences; and the brilliancy of the colours in the picture painted by her, and exhibited to the Society, fully justifies the opinion, that the art of painting in wax, as described in the following letter and account, highly merited the reward of a Gold Pallet, voted to Miss Greenland on this occasion.*]

SIR; Nov. 14, 1786.

I was extremely fortunate, when at Florence the summer before last, in the acquaintance of an amateur of painting, who procured me the satisfaction of seeing some paintings in the ancient Grecian style, executed by Signora Parenti, a professor at that place, who received her instructions from a Jesuit at Pavia, the person who made the farthest discoveries in that art. My friend, knowing I was fond of painting, very politely informed me what were the materials used, but could not tell me the proportions of the composition; however, from my anxiety to succeed in such an acquisition, I made various experiments, and at last obtained such a sufficient knowledge of the quantities of the different ingredients, as to begin and finish a picture, which I shall be happy to lay before the Society for their inspection.

As I must ever consider myself greatly indebted to the Society, for the many honours received from them; should you approve of the discovery being mentioned to the Society, and they think it worthy their attention, I shall be extremely happy in giving them a particular account of the manner in which I accomplished my undertaking.

I am, Sir,
&c. &c. &c.
EMMA JANE GREENLAND.

Mr. More,
Secretary, &c. &c.

The Ancient Grecian Method of Painting.

Take an ounce of white wax, and the same weight of gum mastic in tears, that is, as it comes from the tree, which must be reduced to a coarse powder. Put the wax in a glazed earthen vessel, over a very slow fire; and when it is quite dissolved, strew in the mastic, a little at a time, stirring the wax continually, until the whole quantity of gum is perfectly melted and incorporated; then throw the paste into cold water; and when it is hard, take it out of the water, wipe it dry, and beat it in one of Mr. Wedgwood's mortars, observing to pound it at first in a linen cloth to absorb some drops of water that will remain in the paste, and would prevent the possibility of reducing it to powder, which must be so fine as to pass through a thick gauze. It should be pounded in a cold place, and but a little while at a time; as, after long beating, the friction will, in a degree, soften the wax and gum, and, instead of their becoming a powder, they will return to a paste.

Make some strong gum arabic water; and when you paint, take a little of the powder, with some colour, and mix them together with the gum-water. Light colours require but a small quantity of the powder, but more of it must be put in proportion to the body and darkness of the colours; and to black, there should be almost as much of the powder as colour.

Having mixed the colours, and no more than can be used before they grow dry, paint with fair water, as is practised in painting with water colours, a ground on the wood being first painted of some proper colour prepared in the same manner as is described for the picture. Walnut-tree, and oak, are the sorts of wood commonly made

use of in Italy for this purpose. The painting should be very highly finished; otherwise when varnished, the tints will not appear united.

When the painting is quite dry, with rather a hard brush, passing it in one way, varnish it with white wax, which is put into an earthen vessel and kept melted over a very slow fire, till the picture is varnished, taking great care the wax does not boil. Afterwards hold the picture before a fire, near enough to melt the wax, but not to make it run; and when the varnish is entirely cold and hard, rub it gently with a linen cloth. Should the varnish blister, warm the picture again very slowly, and the bubbles will subside.

When the picture is dirty, it need only be washed with cold water.

N° II.

[*In the year* 1783, *the Society, considering the Education of Youth a matter of the utmost importance, and reflecting on the great length of time usually employed in the study of Languages, offered the following Premiums.*]

"To the Masters of Academies or Schools, teaching Languages.

"WHEREAS it has been observed that the living languages, or languages spoken in schools, are much sooner acquired than the dead languages which are only taught grammatically,

"The Society, desirous to improve the present mode of

education, hereby offers the Gold Medal to the master of any academy, or school for boys, situated within, or not more than thirty miles distant from London, who shall within three years from the date of this advertisement, teach the greatest number of scholars, not less than four, to write and to speak Latin in common conversation, correctly and fluently.

"Also the Gold Medal, for teaching, in the like manner, each of the following languages, viz. the German, the Spanish and the Italian, being commercial languages, not usually taught at schools in England.

"The masters who propose being candidates for the above Premiums, are to send notice of their intention to claim them, to the Society, at their house in the Adelphi, on or before the second Tuesday in November 1786; soon after which, the Society will appoint a day for examining the young gentlemen, and for adjudging the said claims.

"And in order to encourage assiduity in the scholars, whose masters apply for the above Premiums, the Society will give to the greatest proficient in each of the said languages, the Silver Medal."

On the 19*th of December* 1786, *the time appointed for adjudging the Claim*, Dr. EGAN, *attended the Committee, having with him five Pupils, whose names were*

Master Richard Burleigh, aged ..... 15 *years*
John Wilson, ... 11
Thomas Thomason, ... 12
George Wm. M' Donald, ... 12
John Redcross, ... 15

These pupils were examined by the Committee; and having each of them separately made a Translation of a Paper written for the purpose, and answered satisfactorily, in Latin, such questions as were asked them;

The GOLD MEDAL, *being the Premium offered, was adjudged to* Dr. EGAN—*A* SILVER MEDAL *gilt, to* Master RICHARD BURLEIGH; *and a* SILVER MEDAL, *to each of the other young Gentlemen, who had given the fullest satisfaction through the whole of their examination.*

Some time after the Adjudication of the Premiums, the Society received the following Letter from Dr. EGAN, *which, as it contains useful information of his improved method of teaching Latin, and will tend to promote the design of the Society, in the proposing those Premiums, is judged proper to be here inserted.*

Royal Park Academy, Greenwich,
DEAR SIR; March 21, 1767.

MY pupils having frequently entreated that I would convey their grateful thanks to your honourable Society for the testimony borne to their improvement and progress in learning the Latin language; I thought I ought not to resist so becoming a request. Their examination before the Committee of Polite Arts, had already done credit to their heads; and the sense they entertain of the liberal and generous proceedings of the Society, is a proof that their hearts are susceptible of the most amiable feelings. Let me then beg of you, sir, to gratify their earnest desires, by requesting the Society to accept their thanks, for the marks of approbation they have received; and

assurances that these marks shall operate with them, as additional incitements to persevere in the pursuits of literature.

To the thanks of my boys, suffer me to add my own acknowledgment for the opportunity the Committee afforded the young gentlemen, in the length and strictness of their examination, of doing credit to themselves, by the proofs that such an examination produced, of the rapid advancement they had made in their studies, at so early an age. The laudable zeal which prompted the Society to propose medals for the improvement of education has established this truth—That youth may be completed in a classical education, in one half of the time usually devoted to it; and that by consequence they may have greater leisure to improve themselves in other branches of knowledge, to the benefit of themselves and advantage of the public. Fully persuaded of this truth, I entered into the designs of the Society: and the young gentlemen I had the honour of presenting to the Committee, have proved that I was not too sanguine; for it appeared to all the members present, when my boys were examined, that, exclusive of the fluency with which they conversed in Latin, they had acquired an amazingly extensive acquaintance with Greek and Latin authors: and this acquaintance would have appeared more surprising, had they been examined as to their knowledge of English and French; but these living languages were not within the plan or design of the Society. All this they have performed with ease to themselves; for it is my object, to divest instruction of all harshness which strikes terror into young minds, and retards, rather than promotes, the progress of pupils. I endeavour to make study rather an amusement than a toil; to render the hours of recreation subservient to my

views of forwarding the classical part of their education, by inducing them to a habit of speaking Latin readily and accurately. For this end, boys of a certain standing are prohibited the speaking any language but Latin or French; and a signum, or mark, is circulated for the purpose of checking barbarisms and solecisms. When the boy who has this mark, hears a school-fellow utter a word ungrammatically, he passes the mark to him, which is called for three times every day; and he who has had it most frequently, in the interval of those periods, is fined in a small sum. To avoid this penalty, they pay great attention to the choice and arrangement of their words, the construction of their phrases, and the style, purity, and elegance of their diction. When they find themselves at a loss for proper expressions, they consult a dictionary, or apply to a master for assistance; and thus by degrees they acquire a proper mode of speaking; to which the daily versions they make from Latin into English, and from English into Latin, together with the observations they are taught to make on the style of the best authors, do not a little contribute. To the Society I need not point out the happy effects of such a method diligently followed.—With their penetration, they must quickly perceive that a considerable saving of time and expense, must be enumerated amongst its many good consequences, and that, the more generally it is adopted through the nation, the greater will be the benefits resulting from it to society.

Should I be the humble instrument, in the hands of Providence, and under the auspices of the Society, of demonstrating the practicability of such an improvement, and causing it to be generally adopted; the happiness which it would secure to the young learner, the satisfaction to his parents, and the advantage to the community

at large, would be to me, the most desired, the most grateful reward of my labour. At all events, I will unremittingly, while God allows me strength, pursue that plan, which has been approved by the suffrages, and honoured by the applause of the Society; and I will exert my abilities, to encourage others, by my precept as well as example, to make choice of a system which promises considerable benefits to the public.

Having taken the liberty of requesting that you would lay before the Society my own acknowledgment and that of my boys; suffer me now, sir, to express my sincere thanks to you, for the polite terms in which you intimated to me the resolution of the Society, confirming the vote of their Committee in approbation of my endeavours for the improvement of the system now in use. I have also to thank you, sir, for the justice done my boys, both by the very distinct and emphatical manner in which you read their translations to the committee, and the precision with which you took down their answers to the various questions proposed to them by the Committee.

I am, Sir,

Mr. More, &c. &c. &c.

Secretary, &c. &c. JAMES EGAN.

N°. III.

TEACHING MUSIC TO THE BLIND.

Mr. CHEESE'S MACHINE *for* TEACHING MUSIC *to People deprived of sight, and to enable them to preserve their Compositions, in the act of Composing, without the assistance of a Copyist.*

[*In the fourth volume of these Transactions, a short history is given of Mr. Grenville's contrivance for teaching blind persons arithmetic, to which is added a full description and print of the machine; and this year,* 1786, *the Society received from Mr. Griffith James Cheese, a machine for teaching blind persons music, which, on examination by some celebrated professors, was declared to be more simple than those hitherto made use of for that intent, has more characters, and is therefore more copious; and the cushion is so small as to be portable: whereas the instruments in common use for the purpose, are so large as to prevent their being commodiously carried from one place to another, and as, by combining several of these machines, the greatest works in music may be completely written.*

It may not be unsatisfactory to the reader to be informed of Mr. Grenville's opinion of the contrivance, who being present at the Committee, declared he could not draw out an organ part from the score of a full

chorus, unless all the parts were written on such a machine; and it would be the highest delight to every blind musical person to have one of Handel's choruses, written in score, on one of these machines, as it would quite astonish him to know how the parts are disposed; without which he can have no idea of the contrivance of the parts, and consequently is deprived of the greatest pleasure music can afford him.

In consequence of these informations, the Society voted their gold medal to Mr. Cheese, on condition that he left a complete machine, and a proper description, with them, for the inspection of the public. The machine is now reserved in the Repository of the Society; and the following is the description of it, as given by the inventor.]

That part of the machine which represents the book, or paper, is a small cushion stuffed, on a little frame; along which, is sewed a number of packthread strings at equal distances from each other; these represent the lines in a music book: the five which compose the stave are made of large twine; and those which represent the ledger or occasional lines, drawn through the heads of the notes, where the music exceeds the compass of the established stave, are made of small twine, and are on this machine of the same length as the others.

If the practitioner only wishes to write harpsichord music, his cushion may be what length he pleases, and about five or six inches wide. The strings must be sewed in the following order, beginning with the first or lowest, near the edge of the cushion: four small ones, which correspond with the notes in the base of the instrument ff, rr, cc, ee; next, five large ones for the stave which corresponds with the lines in the book, or notes in the instrument g, b, d, f, r; one small one, which represents

the occasional line between the base and treble, or middle c; five large ones for the treble stave, which make the notes e, g, b, d, f; three small ones, which represent the ledger lines when the music goes in alt. These provide for the note a in alt, c, in alt, and e in alt, in the space above which, next the edge of the cushion, the f in alt is written, when it is wanted, which completes the compass of the instrument.

Those who only sing, or play on single instruments, such as violins, &c. should have their cushions not above half the width of those before-mentioned, upon which there should be but one stave, and that in the following order:

Two small lines at bottom, five large ones in the middle, and three small ones at top; neither of the outside lines of these small cushions should be sewed close to the edge, as there are notes supposed above and below; at either end of these small cushions, there should be a small wire staple, in order that any number of them may be combined together at pleasure, by running a rod through the staples; this will enable the practitioner to write what musicians call, SCORE, in any number of parts he pleases; and by this means, a thorough knowledge of the great works of Handel, and all other classical authors, may be acquired as well without sight, as with it.

The characters used to write on this machine, are pins, some with two, three, or more heads, others bent in different forms—some, the heads taken off and the top beat flat; some of these are split, others the heads taken off, and placed near the middle. The bars are pieces of wire crooked at each end; a double bar is made by placing two single ones close together, a double sharp and double flat in the same manner.

The characters are kept in a box, in the same style as the printer keeps his types; each different compartment of which must be marked with a character in writing, signifying what each, contained in the several compartments, is intended to represent. That the master may be acquainted with them, the student must be taught to distinguish each of the characters contained in the box by the feel, as well as the names of each line and space upon the cushion: when he can do this readily, some music should be read to him, which it will be well for him to copy on the cushion; and when that is filled, let it be laid on the desk of the harpsichord before him; and then by feeling over a passage, or sentence at a time, and afterwards playing it, his playing always commencing with the beginning of the piece, or at some particular part of it; this will soon enable him to recollect the whole, when the hands are taken off the cushion, to play what has been last felt. One of those characters, called a direct, must be placed against the note to be next felt: this will enable the student to go on again, after playing, without any difficulty. The person who reads the music, must be instructed not to call the lines or spaces by the letters which distinguish them, lest confusion may ensue, every eighth being the same, but must read in the following manner: first, the name of the character must be mentioned, whether minim, crotchet, or quaver, &c. then the line or space, as for example; minim on the first line, crotchet on the first space, quaver on the second, &c. &c.

When the music exceeds the compass of the stave, it must be particularly mentioned whether above or below, first calling the character, then the ledger line or space.

It is my duty to recommend it to such masters as may

have the care of pupils that require the use of this machine, very early to make them acquainted with the principles of harmony, and the other grammatical rules of the science, as this is the only real assistance which can be given to the memory, and has the farther good tendency of soon enabling the practitioner to play extempore, which style of playing is of far more utility to persons deprived of sight, than to those who enjoy it.

The technical term at the beginning of each piece, is better remembered than wrote down on the machine. The accidental terms, which are best marked by placing some character, not much used, either above or below the note on which it happens, the ingenious mind will find out a method of doing for itself.

This machine will not only teach music; but calling the characters letters, any one will be enabled to spell, read, or write down his sentiments on any subject, and even convey them to his friend without the assistance of a secretary. Arithmetic may be also taught upon this machine; as by calling the dot 1, and the pause 10, a complete set of figures will be formed.

Mr. Cheese will shortly do himself the honour of laying before the Society another invention which is to enable persons deprived of sight, to teach music to those who enjoy it: this he hopes will be sufficient to render the blind master tolerably complete.

Description of the Plate of the Cushion contrived by Mr. Griffith James Cheese, for teaching blind persons music; with the forms of the several Pins used by him, to prick down the various notes, &c.

The upper figure is the cushion, which in its full size

is about three feet long and five inches and three quarters wide, having thereon a representation of musical notes, shown by different pins stuck on it. The lines are of large packthread, with the exception of the three lower ones which are of small twine.

Pins		Pins	
No. 1	A Semibreve.	No. 16	A Demisemiquaver.
2	A Semibreve rest.	17	A Demisemiquaver rest.
3	A Minim.	18	A Semidemiquaver.
4	A Minim rest.	19	A Semidemiquaver rest.
5	Dots.	20	A Natural.
6	A Crotchet.	21	Bars.
7	A Crotchet rest.	22	A Direct.
8	A Quaver.	23	A Tye.
9	A Quaver rest.	24	Base.
10	A Sharp.	25	Tenor cliff.
11	A Semiquaver.	26	Treble cliff.
12	A Semiquaver rest.	27	A Repeat.
13	A Demiquaver.	28	Pause.
14	A Demiquaver rest.		
15	A Flat		

29. This character placed on any line or space, signifies as many notes on that line or space, as there are doubles on the pins: if turned upwards, it implies the same number ascending; if downward, that number descending.

30. A beat or inverted shake.

31. A shake; and where there is a dot placed over, it signifies, a turned shake. Two dots placed over each other, above the notes, without this character signify a turn only.

32. This character is used over the note to signify *forte*; and if a dot is placed above it, *fortissimo*; if the

dot is placed above the note and below the character, it implies *crescendo;* if the character is placed below the note, it signifies *piano;* and if a dot is placed under it, *pianissimo;* but if the dot is above the character, and below the note, it signifies *diminuendo.* In concertos I use the same character placed above the note in the same manner, with two dots over it to signify *tutti;* and below the notes, with two dots under it, signifies *solo:* in vocal music, the same character above the notes, with three dots over it, signifies *symphony;* and below the notes, with three dots under it, signifies *song.*

PAPERS

IN

MANUFACTURES.

SILK-WORMS.

[*THE universal satisfaction which the letters of Miss* RHODES, *published in the fourth Volume of these Transactions, on the Breeding and Management of* SILK-WORMS *in England, have given, plainly shows how much the public wish to see that desirable end accomplished; and as the Society have been favoured with some further observations on this head, by the same ingenious and attentive lady, as well as by the* REV. *Mr.* SWAINE, *of Pucklechurch, near Bristol, whose judicious remarks on this subject are contained in the following Letters, there is every reason to hope the time is not far distant, when by plantations of Mulberry trees being made, and the management of the Worms carefully attended to, our manufactures may be, in a great measure, supplied with Silk the produce of this country, and employment furnished to many poor in the younger part of their lives; by which, habits of in-*

dustry will spread among them, to the general advantage of the kingdom; and the common complaint of the want of proper employment for young women and children, be in a great measure obviated.

The Thanks of the Society were given to Miss Rhodes, and to the Reverend Mr. Swaine, for these Communications.]

Cann Hall, Bridgnorth,
SIR; Dec. 28, 1786.

EQUALLY influenced by your request, and the recollection of my own promise, I again renew the task on which the Society has bestowed such an high degree of attention, and approbation: and although in the prosecution of my scheme, I have experienced disappointments which effectually exclude me from the prize my ambition led to, I cannot think myself totally unfortunate, since those very disappointments may supply the most useful hints to others, and however paradoxical it may appear, are so many new proofs of the practicability of my plan.

I congratulate myself on your having seen my manufactory last summer, as you can witness the number of silk-worms I fed. I had calculated that thirty thousand would produce me about five pounds of silk; and at the time you saw them, I had many more than that number. They were extremely healthy, and supplied plentifully with food by the generous exertions of my friends, who with unexampled kindness, sent me fresh leaves daily, although some of them resided at the distance of fifteen, and twenty miles from me.

About the beginning of July, the worms had attained their full growth, and arrived at that state of beautiful transparency which predicts their disposition to spin: but at this crisis, a chilling north-east wind set in, and we

felt a degree of cold little short of some of the severe winter months. Such an uncommon season had never been remembered here, and its baneful effects were visibly displayed on my little family. All those that were ready to spin became of such an icy coldness, that it was scarcely possible to bear them on the hand: they made some feeble efforts to eject the thread from their mouths, but in vain, for they shrunk into their chrysalis state, without being able to form even the web which incloses the cone. This was equally new and alarming to me, and I watched them with the most anxious attention. The principle of life was visible in them as in the chrysalis's which had spun. That this change was the effect of cold, I had no doubt; but I wished to discover how that effect was produced, and this I could only do by opening some of them. On examination, I found that the glutinous matter which forms the silk, was become so highly congealed by the cold, that it resembled a strong tendon, both in appearance, and tenacity; whereas I had ever found it to be perfectly fluid in those worms which were employed in spinning.

My distress increased hourly, for thousands went off thus every day. It was sufficiently obvious that the making of fires would remedy the evil; but they were unfortunately situated over a range of warehouses, which rendered that, not only dangerous, but impossible. To remove such numbers into the house, was equally impracticable; but, alas! they were soon sufficiently reduced for me to adopt that plan; and in one of the coldest days I almost ever felt, with the assistance of several of my friends, I removed them to their former apartment. Here I kept large and constant fires, and the worms, as they arrived at maturity, pursued their industrious occupations with alacrity.

From this you will perceive, sir, that cold, though it impedes their growth, does not essentially injure the worms, until they arrive at the state for spinning; and that then, a certain degree of heat is requisite to render the silk sufficiently fluid for them to eject it with ease. If I could have made fires at first, I am persuaded that the dreadful havoc would have been prevented; and those who rear them for profit may readily construct places where an artificial heat may counteract the effects of an uncommon season, and prevent such a calamity.

Although the whole summer was with us unusually cold, I lost none until the time I have mentioned: but those which I preserved, by a removal into the house, were comparatively few indeed! not more than five or six thousand.

I well know that the generality of the world form their opinions of the expediency of such an attempt as this, by its eventual success: but surely my failure may be compared to that of the poor farmer, who beholds with delight a plenteous crop bending for the sickle, which, by a sad reverse, a succession of descending torrents destroys; and who nevertheless renews his toil of culture, with better hopes from the succeeding year. True it is, that in one instance we differ materially, for he has no security against another bad season, whilst an artificial arrangement can, to me, distribute a sufficient degree of warmth. The effort I made this year, if successful, would have been final: I must now persevere two or three years longer, for I have resolved not to relinquish my design until I have obtained the quantity of silk necessary for a dress. *This* was originally my sole motive; but I have the pleasure of thinking, that I have abundantly established the following facts:

First, That the management of the silk-worm is by no

means difficult, the principal objection having been obviated, by the discovery, that they may be supported so long a time, on an indigenous plant, which may be procured in all situations.

Second, That our climate supplies a sufficient degree of warmth to bring the silk to the highest perfection, unless in very extraordinary seasons, which may be guarded against by the construction of fire-places.

Third, And that the profits which arise from the manufacturing of silk are immensely advantageous, one-fourth part of the price of the silk being adjudged enough to defray the whole expenses. I know of few circumstances which would gratify me so much as the having been the means of promoting the establishment of a silk manufactory on a large scale.

There was a patent granted by George the First, for the encouragement of one; and two thousand mulberry trees were actually planted at Chelsea for that purpose: how it miscarried, I have not learnt; but many of the trees must certainly remain; therefore that would be the spot best calculated for the trial. For this circumstance, I am indebted to a very ingenious essay on the silk-worm, published by Henry Barham, Esq, in the year 1719, which abounds with the most useful information I have yet met with on the subject; and in which, my opinion of the prodigious profits, and certain success, that would attend the establishment of the silk manufactory in England, is most amply and incontestably supported.

I am, Sir,

Mr. More,
Secretary, &c. &c.

&c. &c. &c.
HENRIETTA RHODES.

Pucklechurch, near Bristol,
SIR; Oct. 15, 1786.

I HAVE just now perused the fourth volume of the Transactions of your patriotic Society; and it is with inexpressible satisfaction, I observe the rapid progress towards perfection which the Arts and Manufactures of this country are daily making under their auspicious patronage. What I am particularly pleased with in the volume I have just read, is, the attention still continued to, and the increasing proofs of the practicability of the raising of silk in this island. The elegant letters of Miss Henrietta Rhodes, inserted therein, have induced me to send you the following remarks, together with the specimen of silk inclosed in the same cover; these, however, are by no means intended as candidates for a distinction similar to that wherewith the letters of that ingenious young lady have been most deservedly honoured by the Society (as I am conscious they have no pretensions of this kind), or in the light of rivalship; but merely to corroborate the testimony there adduced, that the production of merchantable silk from worms fed in this island, is not only practicable, but that there would be almost a certainty of a manufactory of that kind succeeding, were there a sufficiency of proper food easily procurable for the worms which produce it. That food I am confident will never be found in the leaves of any other tree, or plant, than those of the mulberry. For although silk-worms will feed on the leaves of lettuces, and will sometimes spin their web, and go through their several metamorphoses without any other food, when they have been accustomed to that from their first exclusion from the eggs; yet they will never thrive so well, become so large, or spin a web either so good in quality, or so abundant in quantity, as

when they have been fed, during their whole existence in the larva state, on their natural food, mulberry-leaves. And supposing the leaves of lettuces to be an equally proper food for them, yet the great extent of land necessary for the growth of lettuces sufficient for the consumption of any considerable number of worms, must surely render ineffectual every attempt to raise silk upon that plan.

In the Society's second volume we have an account of a very ample reward bestowed on a Mrs. Williams of Gravesend, for her communications on the subject of silk-worms, chiefly tending to show that a substitute for mulberry-leaves had been discovered. I have tried most of those plants recommended by her, and several others, without the smallest appearance of success. The worms would sometimes eat them; but whenever they did, it always proved prejudicial to them, and generally destructive.

In the valuable paper subjoined to Mrs. Williams's letters, written by the Honourable Daines Barrington, it is hinted that a succedaneum for mulberry-leaves might be discovered by examining what insects, in this country, feed upon the mulberry, in common with other plants; presuming from thence, if any should be found, that those plants would resemble each other in their flavour and nutritive qualities. Could any insects be found in the circumstances before mentioned, it might possibly lead to such a discovery. But your correspondent, Miss Rhodes, has remarked (and I have myself noticed the same, that no indigenous insect of this country preys on the leaves of the mulberry; not even the race of aphides, those almost universal plunderers.

As a farther direction to a research of this kind, the observation of botanists may be adduced, that plants of

the same natural class and order have a near resemblance in their virtues and qualities. This clue would lead us to only a few plants of the native growth of this island, which stand in the above degrees of affinity to the mulberry: and these are, the nettle, the box-tree, the birch-tree, and the alder. The most likely of these, I should suspect, would be the birch: for I have not tried either of them, neither do I recommend the experiment to others, as I think all experiments with a view to procure a substitute for the mulberry quite unnecessary. For what necessity can there be for ranging in quest of other food, when the mulberry-tree itself, the acknowledged proper and natural food of these insects, will thrive and prosper in this country as well as most other trees? In very poor soils, indeed, they grow sparingly; but in soils tolerably rich, either those that are naturally so, or enriched by art, they vegetate with all the luxuriance that can be wished. I at present know the owner of two mulberry trees, which have not been planted more than fifteen or sixteen years from the layers, which, in my opinion, would each of them have maintained, for these two or three years past, near three thousand worms in a season.

The chief reason alleged for the necessity of finding out a substitute for mulberry leaves, is, that these leaves are not produced early enough in this climate to become the food of the infant worms. It is well known, that the leaves of the mulberry tree seldom begin to unfold themselves before the latter end of May, or the beginning of June. It is likewise a matter of notoriety, that those few silkworms, which have as yet been bred in this island, have mostly been hatched by the beginning of May, or even earlier. From hence there has been supposed a necessity for providing some more early vegetating plant for their food, before the leaves of that tree are

ready for them. That no such necessity exists, is to me very apparent. Is it not natural to conclude, that the constitution of the air, respecting warmth, should at one and the same time expand the leaf, and protrude the insect which was intended by all-wise Providence to inhabit and feed on that leaf? This, we may observe, is the constant course of nature, with respect to all other insects and their food. We have every reason to suppose that this is the case with the silk-worms and the mulberry-leaves, in those countries where both are indigenous. And I have not the shadow of a doubt that this effect would naturally and invariably obtain as well in this climate as any other, did not human imprudence interpose to prevent it, and art obstruct the intention of nature. The eggs of silk-worms have, in this country, been generally consigned to the care of young people, and chiefly those of the female sex. They have been preserved in bureaus, and chests of drawers, in rooms where fires have been constantly kept during the winter season. In the spring, as soon as the influence of the sun began to be powerful, the eagerness of youthful curiosity has caused them to be removed to windows, where the sun exerted its full power: and in this situation they have been generally forced into existence, within a few hours, in a season when the temperature of the air was unfit for them, and when their proper food could not be procured.

One of your late correspondents on this subject, Mrs. Williams, has proved that the hatching of the eggs may be accelerated, and has averred, that it is even possible to hatch them in the midst of winter: The other, Miss Rhodes, has experienced that it may be retarded beyond the usual time; since, in her second letter, dated the 24th of August, 1785, she informs you, that her silk-worms eggs, in that year, were not hatched until the second of

June, and not even then, without being placed in the sunshine. I have this season retarded it longer, until the middle of June ; when likewise it was effected, by exposing the eggs to the vivifying influence of that great source of life and light. There cannot then, I think, be the least doubt that the eggs of silk-worms may be hatched at almost any time. And I should recommend it to every person who shall hereafter engage in the business of breeding these worms, unless it be for mere amusement, to take care that this effect does not take place until the mulberry-tree is nearly in full leaf.

There are three reasons which appear to me of great weight for recommending the full foliation of the mulberry-tree, as the regulator in this matter. The first is, that there may be a sufficient store of their natural food ready for the young worms, as soon as they come forth from the eggs, which will preclude all necessity for seeking after other food : a second is, that these worms being originally natives of a warm climate, may be sure to be brought to life when the air is of a temperature congenial and agreeable to them ; since it is a general observation among gardeners, that when the mulberry-tree begins to expand its foliage, it is a certain sign of the near approach of fine, warm, settled weather. A third reason is, that the mulberry-trees may be permitted to put forth a good quantity of leaves before any of them are plucked, that so they may not suffer so much in health from that operation, as they otherwise would do, and may be equal to the support of a much larger stock of insects. For it is certain, that the leaves are as necessary to the life of a vegetable, as the skin or the lungs are to that of an animal. If, therefore, most of the young leaves are immediately cropped off, as soon as they are put forth, the consequence undoubtedly will be, that the tree will be so

weakened and retarded in putting forth its leaves, that it will not produce near the quantity it would otherwise have done, and if this usage be often repeated, will inevitably be destroyed. To this last-mentioned circumstance I impute it, that the tender heart of your fair Shropshire correspondent suffered those mortifying apprehensions which she has so feelingly described in her first letter, page 150 of your late publication ; and that so considerable a number as twelve large mulberry-trees were scarcely adequate to the maintenance of ten thousand worms.

If what I have asserted in the beginning of this letter be a fact, that no other vegetable can ever be substituted, with advantage, as the food of silk-worms ; it will follow, that before any attempt to breed them upon an extensive plan can succeed, it is absolutely necessary that the mulberry-trees should become much more numerous than they are at present. Of this the Society, it should seem, have long been convinced ; since they have, through a succession of years, proffered rewards for increasing their number ; but hitherto, I believe, without success.

From the premiums No. 40 and 41, in the class of Agriculture, as they now stand in the last volume, I was led to apprehend, that the Society had given up the matter in despair; and that those premiums were intended to be discontinued. I hope my apprehensions will prove groundless, and to have been occasioned merely by a typographical error.

If it would not subject me to the imputation of impertinence or presumption, I would recommend it to them to multiply their premiums on this head, and to be particularly liberal in their offers.

There are three modes of raising mulberry-trees, to which we are directed by nursery-men. The raising them from layers, from seed, and from cuttings. The chief

method now in practice for those few trees there is a demand for, is by layers. But this is supposed to be an insufficient mode, where great numbers are wanting. And yet elm-trees, which are planted in such numbers in this country, are chiefly propagated by this method. The mode of raising them from seed, is not only tedious, but uncertain; as the seed seldom ripens sufficiently in this climate, and the dependance on foreign seeds of any kind is extremely precarious. The late premiums of the Society have respected only the last method, namely, that of raising them from cuttings: this would be, doubtless, the most advisable method for raising a large number of trees in a short time, provided the cuttings of the mulberry-tree could be made to take root as readily as the cuttings of willow, poplar, and some other trees. This, however, is not the case; for, with the greatest care, many of these cuttings will not grow unless assisted by artificial heat.

I have taken notice, that whenever the branches of a fig-tree have been some time inclosed in the shreds, by which they are usually tacked to the wall after pruning, abundance of budding roots are generally put forth. From hence I surmised, that cuttings of any trees might probably be prepared for taking root more certainly and expeditiously, by tying a shred of old woollen cloth, or such like substance, pretty tight round every shoot that is intended for a cutting, as soon in the summer as it has made any considerable progress, at the place where it issued from the last year's bud. I tried this experiment last season, on some cuttings of the arbor vitæ, and the althæa, the cuttings of which shrubs are known to take root in the common method with great difficulty. And though these did not succeed agreeably to my sanguine expectations, yet I am very unwilling to think this ex-

periment decisive. May not some substance be discovered which would more powerfully solicit the incipient roots, than that which I have tried? Whatever would attract moisture from the air, and at the same time be void of causticity, or other corroding or injurious quality, I should imagine would be most likely to have this effect, if any such could be found.

Perhaps the following Premium (provided the Society's fund was equal to it, which, from the very numerous and respectable list of members, I have no doubt of) might have very beneficial consequences in respect to this object, the speedy increase of mulberry-trees :—To any person who in the year ——shall plant, or cause to be planted in any one parish, township, or place, any number of mulberry-trees, not less than fifty, of the height of three feet or upwards, in places well secured, and not within the distance of eighteen feet from each other, the sum of five guineas; to the person who shall so plant, or cause to be planted, the greatest number, the Gold Medal in addition; to the second greatest number, the Silver Medal in addition. Claims, with certificates, to be sent in immediately after planting; and other certificates to be sent, that the plants are in a growing condition two years afterwards, when the claimants should be entitled to the rewards. And any person to have the liberty of claiming the pecuniary part of the above premium *toties* until the Society should think fit to discontinue it.*

This, I should think, would stimulate gardeners and nursery-men to raise great quantities of these trees to plant them out for people in gardens, orchards, &c. at a low price; or even, if they could not get purchasers, to

* In the premiums offered this year it will be seen what attention has been paid by the Society to the hints given above.

plant them gratis. The obtaining of Mulberry-trees I look upon as the first and grand object. In the scarcity of these, lies the great stumbling-block ; and whenever this shall be effectually removed, I am confident that the raising of silk in this country will be no difficult task.

The specimen of silk, herewith sent, contains six small skeins, each of them the whole length of the web (except the waste silk first taken off, and a very little left surrounding the aurelias) of a dozen worms reeled off together. The bit of paper rolled round a part of each skein, was set as a mark to find the extremities, and to prevent all entanglement. They are sent in this detached manner, that the Society may, if they please, satisfy themselves as to the length, by causing an actual measurement of each skein or thread to be taken. Whether either of them will equal the length of the spinning measured by Miss Rhodes, I much doubt. The cocoons were reeled off in hot water, wherein a little gum senegal had been dissolved. I have reason to think, that the young lady just mentioned has been misinformed respecting the gum being the criterion whereby to judge of the goodness of silk ; since I have been assured by a very intelligent silk-throwster, that the gum, so apparent in the bales of silk imported from abroad, is not the natural production of the silk-worm, but chiefly the addition of art : and that the silk, when received, is oftentimes so highly stiffened, that the workmen are obliged to discharge much of the gum, by diluting it in water, before they can reel the silk off from the skein, or manufacture it in any way whatever. I have tried the experiment of reeling off the cocoons in boiling water; it has a good effect in dissolving the natural gluten, which causes the web to part more freely ; but I was never so fortunate as to find the lives of the insects preserved after passing through this severe ordeal.

The most troublesome office in the business of breeding silk-worms, is the cleaning them. This, in the common mode, is a tedious and disagreeable task, as well as incommodious, if not injurious, to the worms. Miss Rhodes did not think this operation necessary oftener than once a week. It has appeared to me to be absolutely necessary to the health of the insects, when they are full grown, or nearly so, that it should be performed at least once a day. I have the idea of a simple apparatus, whereby I imagine this obstacle will be totally removed, as well as some other inconveniences, which I mean to get realized before the next breeding season. Should it please me so well, when reduced to practice, as it does at present in theory, I shall take the liberty to send you either a model or description of it.

I am, Sir,

&c. &c. &c.

Mr. More, G. SWAYNE.

Secretary, &c. &c.

N° II.

HEMP.

In the fourth volume of the Society's Transactions, mention has been made of the seeds of a very large kind of HEMP *having been sent to the Society, from the Honourable East India Company, and some accounts given of the culture of the Plant. See Vol. 4, p. 32. &c. Although these seeds were distributed to many persons,*

and the plants grew well, yet it does not appear that much attention has been paid to the preparing the Fibres into a state fit for the purpose of Manufactures; one sample only having been received, and that from John Wilkinson, Esq. of Broseley. It is the opinion of that gentleman, that, notwithstanding the great size to which this species of hemp grows, yet, from the difficulty of separating the fibrous parts, the great length of time required for steeping, and the uncertainty of the seed, when brought from such a distance as China, growing in this climate, it will hardly ever become a matter of great national importance.

The last reason seems to have considerable weight; for the hemp seed, said, in Vol. 4, page 242, to be presented to the Society, by the Directors of the East India Company, has been found, on repeated trials, not to be in a state proper for vegetating.

Another material, under the name of Hemp, in the rough state from China, has also been received from the East India Company; of this, trials have been made, by an experienced workman; and it appeared, by samples produced, that the hemp dressed, the thread, the cloth, and the ropes manufactured from it, are excellent of their kinds, and if this hemp can be imported at a price for the market, it seems likely to answer many valuable purposes,

These samples, which are now reserved in the Society's Repository, were sent to the Court of Directors of the East India Company, for their inspection; and in answer to the request of the Society, "That the Court would inform them, if they thought it not improper, at what price this kind of hemp could be imported into England" the following letter was received :—

East India House,
Jan. 3, 1787.

SIR;

YOUR letter of the 23rd of November last, having been laid before the Committee of Warehouses of the East India Company, I am directed to request you will be pleased to express to the Society, the Committee's thanks for the information containedtherein respecting the hemp from China.

Agreeable to your request, I return you the samples manufactured therewith, and have further to communicate, that the Company not being in possession of the price of the said hemp in China, they have given directions to their super-cargoes there, to furnish that information, which, when received, shall be transmitted to the Society, but I am to add, there is very little probability of its being imported into England with any advantage, owing to the very high rate of freight from China.

I am, Sir,

Mr. More, &c. &c. &c.

Secretary, &c. &c. THOMAS MORTON.

[*The many important uses to which hemp is applied, and the very great price of that article at present, render the consideration of obtaining a proper supply of it, an object of the first importance; and in order fully to ascertain the value of this material from China, in our manufactures, some of it has been sent, by the Society, to a principal manufacturer of sail cloth, whose sentiments thereon will be laid before the public at some future period.*]

PAPERS

IN

MECHANICS.

N° I.

HYDRAULICS.

The Representation of JOHN SMEATON, *Esq. concerning the* HYDRAULIC ENGINE, *invented by Mr.* WILLIAM WESTGARTH, *of Coldcleugh, in the County of Northumberland for raising Water by Water.*

[*IN the year* 1769, *a Bounty of Fifty Guineas was voted to Mr. Westgarth, for his invention of an Hydraulic Machine, which was then strongly recommended by Mr. Smeaton, as will be seen by his letter, dated April* 29, *in that year.*

Although, from that time, a Model has remained in the Society's Repository, no account of the Machine has hitherto been published, by which the several contrivances can be clearly understood; but Mr. Smeaton having obliged the Society with a full description, and correct drawings of all the parts, the whole is now

submitted to public inspection, as likely to prove of very considerable advantage in many situations, particularly among the mines in various counties in these kingdoms.

The Society, fully sensible of the merits of Mr. Smeaton's account, voted him their Thanks, and a Silver Medal, for the particular care he had taken in the description of Mr. Westgarth's Machine, and for the attention he has shown to the views of the Society in this instance.]

Austhorpe,
April 29, 1769.

Mr. SMEATON begs leave to advertise his friends and acquaintance, as well as all those who are desirous of promoting the success of good mechanical inventions, that they will find the engine, the model of which will be exhibited by Mr. Westgarth, to be highly worthy of their attention and regard; being, in his opinion, one of the greatest strokes of art in the hydraulic way, that has appeared since the invention of the fire engine. This machine is founded on one of the most simple principles of Statics, viz. that of a heavier column of water pressing up, or raising a lighter; an idea which, though proportionably obvious as it is simple, and therefore far from new, having been adopted by several eminent mechanics; yet it has been reserved to Mr. Westgarth, to form the proper expedients, and obviate those difficulties which attended the practical execution of machines intended to work on this principle; and which contrivances are (as to my knowledge) not only new and peculiar to Mr. Westgarth, but which alone have contributed to its success: and therefore, though the

whole composition dependent thereon, is highly deserving a patent, or exclusive privilege, yet Mr. Westgarth, choosing rather to exhibit and communicate his invention to the public, seems, for that very reason, the more highly deserving a reward from the patrons and encouragers of art; and the more worthy of proper notice, as he has not been hasty in communicating his invention until the value thereof has fully appeared, by a number of engines built at large, and applied to real use.

Independent of the various draughts, experiments, and essays on models, which, as I am informed, Mr. Westgarth had in hand, for years prior to his attempting a machine in large; I had the pleasure of seeing the first complete machine of this kind at work, for draining or unwatering a lead mine, belonging to sir Walter Blackett, at Coldcleugh aforesaid, in the summer of the year 1765; since which time, that machine has been shown to all those who had the curiosity to see it. He has now erected four others in the different mines in that neighbourhood, one of which I have seen, and all attended with equal success, as I have great reason to believe, not only from the nature of the construction, but from the reports of those for whom they have been erected. This machine is not only peculiarly adapted to the raising of water by water for draining of mines, but the same principle can readily be extended to the raising of water for supplying towns, gentlemen's houses, &c. and universally for raising water from any depth, wherever a fall of water can be procured: and particularly in those cases where the fall is great, that is, where it exceeds thirty or forty feet, it will, in my opinion, not only exceed all other known machines in effect, but in simplicity; and that, whether the quantity of water to be applied is great or small. I therefore think this machine is not only very

curious in itself, but will be of great advantage to the public.

J. Smeaton.

Description by J. Smeaton, Esq. F. R. S.

The first of these engines was completed by Mr. Westgarth, for the use of draining or unwatering a lead mine, at Coldcleugh, belonging to the late sir Walter Blackett, Bart. whose principal agent he was for that, and the rest of his mines in that neighbourhood. It was first set to work in the year 1765, and was at once attended with complete success; and I believe continues a working engine at this day. In consequence hereof, he was called upon by the miners of the neighbouring manor of Alston-moor, belonging to Greenwich hospital, to construct machines of the same kind, in such situations as seemed eligible; and three or four more of the same sort, were also made with success in the course of three or four years, which induced Mr. Westgarth to think of applying for a patent for the exclusive privilege of using this invention; but previous thereto, he was pleased to advise with me concerning it, being at that time frequently in those parts of the country, as an agent of Greenwich hospital.

Much as I admired the ingenuity of Mr. Westgarth's invention, I dissuaded him from the thoughts of a patent; as it would take a length of time to be sufficiently known; and the number of cases in which it could be properly applied, were not sufficient to be likely to afford such a number of premiums, as might defray the expense of a patent, with a prospect of advantage to himself and family. I therefore recommended it to him, as the Society for the encouragement of arts, manufactures, and

commerce, were, by handsome premiums and bounties, encouragers of all useful inventions and improvements, to communicate his invention to them, that it might be made public; in confidence that he would obtain a bounty for the same, of such value as to the Society should seem meet: and in consequence hereof, I gave him a representation of the utility of his invention, with which, in the year 1769, he applied to the said Society, and obtained a bounty, upon condition he delivered to the Society a working model, and a draught, showing the construction of the engine. But as the death of Mr. Westgarth, which happened not long after, prevented the usefulness of the machine from being so successfully spread, as it otherwise doubtless would have been; and as some of the most essential parts of the machine, cannot be seen in the model, without its being taken to pieces; and the drawing not being accompanied with any literal explanation, nor the detail of it sufficiently made out; at the request of the Society, I have now supplied those defects, that it may be published in such a manner that the utility of it may be seen, and the means of making and applying it in a proper situation, explained.

The Hydraulic engine the most in use at the mines, is vulgarly called the *Bob-gin;* and, from the simplicity and easy application thereof to the situations and purposes of mines, has been in use among them, beyond the reach of any traces concerning its origin. It consists of a water-wheel, most commonly overshot; a single crank or winch, at one or at both ends of the axis, as occasion may require, for the application of one or two balances, for the working of one or two pumps. Nothing can be more commodious in mountainous countries, where there is often great plenty of fall, and not an abundance of water.

There is however a limitation to the extent of the use of this machine: for when, for the sake of making the best use of a small quantity of water, it would require the water-wheels to exceed forty feet in diameter, or height, then they become so heavy, unwieldy, and expensive, as on these accounts to be ineligible; and they rarely exceed fifty feet.* Where therefore a rich mine, a necessity of power, and a scarcity of water concur, in former times (before the use of fire engines) they frequently placed water-wheels of a moderate size one above another; taking their water in succession, and uniting their powers in one: but in this way, when more than two or three wheels are necessary, the machine still becomes unwieldy and expensive.† It was therefore a *desideratum*, by way of supplement to the water-wheel, to have a machine on such a construction, that would

* The largest I ever saw, was in Cornwall, and forty-eight feet diameter; the largest I ever constructed is forty-seven feet.

† When I was first in Cornwall, in the year 1757, I was there told of a famous engine, that had been worked in the memory of those alive, but of which no traces were remaining; it was called the *Tower-Engine*; and consisted, as well as I remember, of ten water-wheels, of twenty feet diameter, one above another, so that it required a building in the form of a tower to contain them. Every water-wheel being furnished with its proper cranks, they were all united in their efforts by two spears common to all, which ultimately acted upon two pumps. I saw myself, on that journey, two water-wheels, one under, and taking its water from the other, which (if I rightly remember) were forty-five feet diameter each; each working, by a single crank, a single pump which lifted the water to each other. What an expence might here have been avoided, had they been acquainted with Mr. Westgarth's construction! for besides the expence of machinery, that of cutting out, and supporting the ground for the case or cavity, wherein these wheels worked, being both under ground, will be seen, by the experienced miner, to have been no small matter.

take in an unlimited perpendicular fall, with any quantity of water, however great or small :* and efforts have not been wanting to produce a statical machine, whereby a heavier column of water might overcome and raise a lighter ; but the means of constructing a slide, cock, or valve, whereby the pressure of the acting column might be alternately left at liberty to act, and its action suspended, so as to do its business without too much friction, or wear in consequence of it, was left to the invention of Mr. William Westgarth, who happily conceiving the idea of constructing a sliding valve in the form of a cylinder, the action of a column of water upon its external surface, being equal all round, would have no tendency to drive it towards this side or that : and in this particular, the peculiar merit of his invention consists.

Plate No. 1, is a reduction of Mr. Westgarth's drawing, which accompanied his model ; it is therefore not to be considered as a design for an engine in real service ; but the model being made to a size sufficient to work, it will be equally comprehended by the intelligent artist, how it is to be applied, as if it was a drawing of an engine at large.

* About seventeen years ago, I erected an engine upon Mr. Westgarth's principle, at Templenewsam, the seat of the right honourable lord viscount Irwin, in Yorkshire, for serving the house with water from an eligible spring. The perpendicular descent of the water made use of as a power, was sixty-seven feet ; and the quantity expended at each stroke of the engine, being only a single pint, shows how small a quantity of water may be usefully employed in this mode of construction.—This engine delivers also a pint of water at each stroke into the reservoir at the house ; which is elevated above the spring, nearly half the perpendicular that the acting water descends ; the distance being about two hundred and fifty yards : and as it will go sixteen strokes per minute, the water delivered amounts to eight barrels, beer measure ; or fifty-five hogsheads per twenty four hours.

AB is a working barrel, which, for the sake of distinction, we will call the working cylinder.

C denotes a bucket or piston, without perforation,* being leathered upwards, so as to prevent the water of a column resting upon it, from descending, without the descent of the piston itself.

C D represents a column of water resting upon the piston, of any perpendicular height that is required, or that the situation admits of; being held in by the different lengths of pump-trees, that are placed above the working cylinder; at the top of which is

E F, a cistern for receiving water from the supply or source.

Now, suppose for a moment, that the working cylinder was open at the bottom, that the piston, supported by its rod or spear, was suspended by a proper chain upon the arch head G, of

G H the working beam, from whose end H, by a similar chain, the spear H I descends down to I, which denotes the bucket of an engine-pump, with valves or falls, opening upward, as in common.

K L denotes the working barrel of a common engine-pump; which is placed within the pressure of the atmosphere, above the bottom of the mine or shaft, with as many lengths of pump-trees upon it, as will bring it up to the level of the drain, or sough, by which the water of the mine is to be discharged. The trough M N is supposed to discharge the water from the pump, into the cistern O, placed at that level. Now it is evident by the construction, that if the column of water C D is of a

* A small hole through it, with a bit of leather upon it as a valve, was used by way of giving an occasional passage to the air from below upward.

greater hydrostatical weight, than that in the column of the pump, the heavier column will overcome the lighter; and the column CD, by descending, will raise the column of water in the pump, and discharge it into the cistern O: and the piston C will continue descending, until, to prevent its getting below the working cylinder, the arch head G is stopped by its pin at a; and in this position the machine must ever remain, without the intervention of art.

If, instead of the working cylinder being open, as first supposed, it is connected with the pipes, b, d, e, f, which, for the present moment, may be supposed all open; then, if the several cavities under the piston be supposed filled with water, this water having free passage out at f, will not impede the descent of the piston, but discharging itself at f, rise up at the cistern O, until it runs over at the discharging place g, and there runs off into the sough, along with the water discharged from the pump. The piston will nevertheless remain in the same position wherein we before left it.

Suppose V to be a cylindrical valve, made to slide up and down upon the outside of another hollow cylinder; and that, by means of square holes through the same as represented under the valve V, the water communicates freely from the pipe d to the pipe e, then there will be nothing to hinder the effect I have just described. But if we suppose that the valve V is slided down, so as to cover those holes, and at the same time, another set are opened above the sliding valve, perfectly similar to the former, but that there is a diaphragma, or stop in the bore of the inner cylinder, betwixt those two sets of holes, so that there is no communication for the water from the upper to the lower part of the cylinder; then if there is by this means a communication opened between

the pipe d, and the pipe h, through the upper set of holes, and also an open communication from the pipe h, through the pipe i, to the pump-tree at k; if the weight of the spear H I is heavier than that of G C and sufficiently so to overcome the friction of the piston, bucket, &c.; there will then be nothing to hinder the bucket from ascending, because the weight of the whole column D C b is supported and stopped from flowing out through the lower set of holes by the valve V, which now covers them; and there being nothing therefore to hinder the water displaced by the ascent of the piston, from making its way progressively from the pump-trees at k, through i, h, d, and b, and so filling up the space left by the piston, it will continue rising, until, to prevent the piston's getting out at the top of the working cylinder, the arch head H, is stopped upon the spring frame by its pin at x; and here again it must remain, until a new modification of the parts takes place. It is obvious, that if the valve V is slid up again into the situation the figure represents it, that the column DCb again preponderating, will make a fresh stroke, and so *toties quoties*.

It is now proper to enter into a more particular explanation of the cylindrical valve; and as Mr. Westgarth has given no enlarged drawing thereof, I have endeavoured to supply this, by what is contained in plate No. 2. wherein fig. 1. represents the section, and fig. 2. the plan thereof, the letters referring to the same things in both.

A B, B A, represents the section of the sliding valve marked V, in the plate No. 1. being an hollow cylinder, truly bored in the inside, and open at both ends.

C D, E F, is also a hollow cylinder whose external surface is truly turned and wrought; so that the valve may just slide easily upon it, without sticking in any part.

C G, D G, and E G, F G, show two flanches cast in the solid upon each end of the internal cylinder, which is, in reality, made of two pieces, for the sake of getting the external cylinder upon it; each piece having its own bottom: these are joined together by screws, with a piece of thin leather or oiled parchment, between them.

H I is the bottom of the part of the cylinder F H I E; and K L M N is the bottom of the part of the cylinder C K L M N D, leaving a groove round the cylinder, whose section is O P: and those bottoms form the solid diaphragma, or stop, by which all communication of water between the upper cavity of the cylinder and the lower, is cut off from the lower.

Q Q Q show the places of three of the four square openings, that are pierced through the sides of the upper cavity of the internal cylinder, and which, in this position of the cylindrical valve, are covered thereby.

R R R show the places of three of the four square openings, pierced through the side of the lower cavity; and, in this position of the valve, are shown as open.

S T shows an iron bar affixed to the valve, and working through two slits cut through the under part of the interior cylinder, as V W, V W; this bar being laid hold of at the hole X, by an upright bar connected therewith, and its lower end with the lever, marked l m, in plate No. 1. it is manifest how the motion of the valve V is managed by the rod attached to the lever l m, whose end m coming out into the water of the open cistern, and being there laid hold of by the upright rod, the motion of the valve up and down can be communicated from the common tumbling geer, as used in the fire engine; and the valve is made to open one set of holes, and shut the other alternately, at the end of each stroke of the engine, by means of the plug frame

P Q dependent from the little arch R, upon the working beam, in the same way as in the fire engine, which is distinctly shown by the figure itself.

In considering the particular construction of the valve, plate No. 2. it is taken for granted, that the joint between the cylindrical valve, and the inside cylinder upon which it slides, is perfectly water-tight, notwithstanding its sliding motion; for if we suppose it not perfectly so, then the water acting through the holes Q Q Q, and percolating through the crevice between the cylinders, will in effect open a partial communication between the upper cavity and the lower; and, consequently, whatever this quantity is, will be a constant waste of water, from the source to the cistern O, without doing any work: and though superior artists might possibly effect such a movement, yet it is not to be expected from the sort of workmen usually employed about hydraulic engines in mines; and even if effected, as the continual wear of the parts would render the cavity of the valve larger, and the internal cylinder less, without some principle of accommodation to the rigidity of the materials, if delivered water-tight out of the artificer's hands, they could not be expected long to remain so, after being in use. Such a principle of accommodation, Mr. Westgarth's ingenuity and sagacity provided, and introduced in the following manner:

The groove O P plate 2, is shown to contain the section of a leathern strap, a b; such leather as bridle-reins are made of, is fit for this purpose: a piece is cut, whose breadth is the same as the height of the groove, and whose length is about an inch, or rather better, longer than the circumference of the cylinder. The two ends are to be thinned off in form of a wedge; but when brought together and overlapped, they will form nearly the ordinary thickness. A strip of thin plate copper is

also to be provided, whose breadth is such as to go freely into the groove, and whose length is somewhat less than the circumference of the cylinder; so that the leathern strap being put into the cylindrical valve, and the strip of copper (rendered circular) within it, the two ends of the copper are not to come quite in contact. The strip of copper being supposed to have been rendered elastic by being well hammered, and set to a circle larger than that of the valve; when the strap is confined within the sliding valve, and the strip of copper within the strap, the constant endeavour of the copper-slip will be to enlarge the circumference of the strap; and by causing it to stick close to the internal circumference of the valve, it will close the joint between that and the external surface of the internal cylinder, and effectually prevent the water getting down between the two cylinders; and will enlarge itself in proportion to its own wear, and that of the brass work wherewith it is in contact.

Furthermore, though all communication is by this means prevented from the upper immediately to the lower cavity; yet if the water acting through the holes Q Q Q, and through the crevice Q E, Q F, is not stopped by a water-tight joint between the upper end of the valve BB, and the flanch F G, E G, the water making its way there into the general surrounding cavity, that contains the whole valve, will be at liberty to get through the lower holes RRR; and thence into the cistern O, of the general design No. 1. In like manner, when the valve is down, if there is not a water-tight joint between the lower end of the valve A A, and its seat upon the lower flanch C G, D G, the water would escape from the surrounding cavity, through the crevice between the two cylinders, and through the holes R R R, into the said cistern O. To prevent which, Mr. Westgarth has introduced rings of

flat leather upon both the flanches, to make good the seat of the valve, whether up or down; which rings of leather may be held down by brass rings, whose sections are represented at yy, zz, confined down by screws: and these flat leathers serve a further purpose; for being made about half an inch larger than the circumference of the flanches, those borders turned up, maintain a water-tight joint between the valve and the general cavity in which it is lodged, marked in plate, No. 1. n q; and by unbolting and taking off the side pipe S T, the valve may be got at, taken out, and inspected at pleasure.

At W is represented a round block of wood, which by a screw can be lowered at pleasure; and as it is introduced in Mr. Westgarth's drawing, needs some explanation. I conceive it to be an expedient peculiar to the model (of which the drawing, as I have already hinted, is the design) to regulate the rise of the piston, which, as it cannot rise faster than the water can get round from above to below it, by letting down this piece of wood, the passage i can be so straightened as to prevent the piston from rising so suddenly as to disorder the working geer. This, in the work at large, is scarce necessary, because this matter may be sufficiently managed by the poise of the parts; whereas, in the model, the friction bears so great a proportion to the whole power, that a small difference of resistance, will either make the machine stick fast, or allow it to go with too much rapidity, unless there is some curb upon it that will take place in proportion to its velocity.

To give the ingenious reader some idea of the real proportion of the parts, it may be proper to say, that in the Coldcleugh engine, according to the best of my memory, the working cylinder was ten inches diameter, the descending pumps were from twenty to thirty fathoms;

and when the column of the pump was about half the hydrostatical weight of the descending column, the engine would go ten or twelve strokes of seven feet each, per minute.

The working beam was about twelve feet long.

The water shown in the cistern Y X Y, in the model, is to represent the water generated in the mine, and from thence flowing to the pump-foot at Z; to which is supposed to be annexed a proper length of suction pipe, according to circumstances.*

N. B. It may be proper to remark, that the scale of the valve, plate No. 2. is sixteen times larger than that of No. 1. and that a valve of four inches diameter is found sufficiently large for a working barrel of eight inches.

* On seeing this engine in the years 1765, Mr. S. suggested to Mr. W. that if this engine, instead of the *great lever*, was made to work with a *wheel*; and instead of the long spear going down the descending pump-trees, the piston was made to communicate with the main chain through a collar of leathers, or *stuffed collar*, in the manner of (what is called) a *jack-head* pump; that then the whole of the machinery would stand together just above the *level* or *sough*, and there would take up less room, as the work might in general be comprehended within the limits of the *shaft*, and the descending pumps might also be of a lesser bore, and be fixed in a corner of the shaft, and therefore be upon the whole much more convenient for underground works; and in this mode, the latest engines of Mr. Westgarth were actually constructed with success.

PAPER

IN

COLONIES AND TRADE.

RED EARTH.

[*IN the year* 1774, *the Society received from one of their corresponding members in Jamaica, a Cask of Red Earth, a proper quantity of which was sent to several architects for trial. No report of the success of the experiments was made, until the letters from Mr. Mylne, dated November* 30, 1784, *and February* 28, 1786, *were received; for which, thanks were returned to Mr. Mylne.*

As the usual properties of this Earth are now ascertained, and the discovery of such a material may be of very extensive service to the island of Jamaica, and other parts of the West Indies, although the expense of freightage may preclude the use of it here, it has been judged proper to publish the following letters from Mr. Mylne, on the subject; with a copy of the letter, written by the Secretary, to those gentlemen to whom the Earth was sent for trial; which letter contains an extract of the account, originally received by the Society, of the Earth, and manner of using it.]

Adelphi Buildings,
SIR; Nov. 3, 1774.

THE Society for the encouragement of Arts, Manufactures and Commerce, have lately received from Jamaica, a quantity of red earth; and I am directed to send some of it to you, and request the favour of you to oblige the Society with your opinion of it. The gentleman from whom it comes, thinks it a kind of *puzzolana*, and describes his method of using it as follows: "To one measure of the red earth, add two of the same measure of well slacked lime, and one of sand; and then let them be well mixed and wrought like common mortar, with fair water, and so made up in a heap; but in about eight hours it will begin to acquire a hardness, and the heap must be cut down, and well wet with water, and smartly worked and mixed over again, and so smartly worked and wet morning and evening, for a whole week, before it is fit for use; and after it is laid on, it must be strictly attended while it dries and hardens, to close any crack that may appear in the drying, for about forty-eight hours, and then it is generally out of danger.

"But if any cracks, &c. should appear after it is quite dry, as suppose the covering of a building, cistern, &c. a labourer, with a little sand or brickdust, and a little common whitewash, thrown over the crack, and smartly rubbed in with a brickbat, or sandy stone, the crack will soon disappear, and the work will be as good as ever.

"Cisterns, reservoirs, canals, and all manner of conveniences to collect rain-water, and retain it, of any reasonable dimensions, may at a very small expense be made, and completely finished with this composition, to contain and secure rain-water.

"By means of this composition, a mortar may be made

(far exceeding any other) wherewith to lay the foundation, and raise the superstructure of any dam, bridge, or guttering; and, in short, any kind of building where water or any kind of liquid is to be concerned, because the soft new-made mortar will harden, and soon become like a stone totally immersed in water.

"Of this composition may be made the best coverings for all manner of buildings; witness my own house, that has been covered with this composition (though not at that time brought to its present perfection) these twenty years, and is not a pin the worse.

"In regard to matters of pleasure, terras walks, canals, flower-pots, urns, obelisks, statues, and even colossal statues, and other ornaments for gardens, may be made of or with this composition, as it resists rain, and every sort of moisture, and nothing but violence will make the least impression; so that the five orders of architecture, with their various ornaments, may be most elegantly expressed on the outside or inside of buildings, in the plasterers way, and last for ages, if no violence is used to them.

"In covering a building, I would choose to lay it on six inches thick, upon a flat strong-framed well-lathed roof, as it will shrink in drying, and is the best and cheapest covering I know of, as I have experienced ever since 1747."

Thus far the account from the person who sent it; and I beg leave to say, that if you require any larger quantity for trial than is now sent, it will be furnished to you by your applying to the Society.

I am, Sir,

&c. &c. &c.

Mr. Mylne. SAMUEL MORE, *Sec.*

New-River Head,
SIR; Nov. 30, 1784.

I HAVE made a fair trial of the Puzzolana earth, received some years since from the Society for the Encouragement of Arts, Manufactures and Commerce; and although it has lain long by me, it turns out a very good substitute for Dutch terras, or Italian Puzzolana, for works immersed in water. As you have informed me, there still remains a quantity of it in the Society's possession I should be glad of some, to make further trials in other situations, and shall be glad to know the particular place in Jamaica from whence it came, and the christian name of Mr. Brown, by whom it was sent. It was tried against some British materials, and proved far better than any of them.

I am, Sir,
&c. &c. &c.
ROBERT MYLNE.

Mr. More,
Secretary, &c. &c.

New River Head.
SIR; Feb. 28, 1786.

I HAVE it now in my power to write to you decidedly on the red earth, of which I received a specimen for trial in water-works.

I have put it to very severe trials, and have found it answer extremely well, as a substitute for Dutch terras, or Puzzolana earth from Italy: they are all three volcanic substances, and have the same peculiar qualities. Besides what I received from you, I obtained, by means of a friend, a quantity from Jamaica, which, on comparative trials, proved the same as that you sent me: it is found in vast quantities on the estate of Mr. Brown, in the parish of St. Elizabeth, in Jamaica. There are many

acres of it, for it lies on the surface of the ground; in this it is different from Puzzolana, which lies in strata under ground like coal. Dutch terras is a *Tufa* stone, found on the rocky banks of the Rhine, and reduced to powder, by mills in Holland.

Mr. Brown who sent this Jamaica terras to the Society, is now dead; and the estate on which it was found is called Dettingen, and is now the property of his son, a very intelligent gentleman.

On enquiry into the means of bringing it into this country, I find the expense of carriage to the water-side there, and freight to this country will prevent the use of it here. I wish it however to be made as public as possible. It may be of use to the inhabitants of the West India islands and some other of our colonies.

I am, Sir,

Mr. More,
Secretary, &c. &c.

&c. &c. &c.
ROBERT MYLNE.

REWARDS

BESTOWED IN

AGRICULTURE.

Class 29.—To Thomas White, Esq. for having planted in the year 1785, thirty-seven thousand two hundred and thirty Alders, on thirty acres, four perches of land, on his estate at Butsfield, in the parish of Lanchester, Durham, the *Gold Medal.* See a particular account of this plantation, page 2.

To Mr. James Pike, Watch-Maker, at Newton Abbot, Devonshire, for his new-invented Chaff Cutter, Twenty Guineas. See a Description and Plate of this Machine, page 29.

POLITE AND LIBERAL ARTS.

Class 120.—Honorary Premium, to Miss Elizabeth Smith, Great George Street, Westminster; the *Gold Medal.* Subject, The Holy Family.

Class 121—Honorary Premium, to Miss Ann Whitehead, Basinghall Street; the *Silver Medal.* Subject, A Portrait of Sir Peter Paul Rubens.

Class 132.—Drawing of Birds. To Mr. John Lewen

Stepney Green, the *lesser Silver Pallet.* Subject, A Hawk, and Small Birds.

Class 140.—Teaching Languages. To JAMES EGAN, L L. D. Royal Park Academy, Greenwich, Kent, the *Gold Medal,* for teaching the Latin Language expeditiously and correctly. See a more particular account, and the letter from Dr. Egan, page 49.

Class 144.—Proficiency in Latin. To Master RICHARD BURLEIGH, at Dr. Egan's Academy, the *Silver Medal gilt,* for writing and conversing correctly and fluently in Latin.

Proficiency in Latin. To Master JOHN WILSON, at Dr. Egan's Academy, the *Silver Medal,* for writing and conversing correctly and fluently in Latin.

Proficiency in Latin. To Master GEORGE WILLIAM MACDONALD, at Dr. Egan's Academy, the *Silver Medal,* for writing and conversing correctly and fluently in Latin.

Proficiency in Latin. To Master THOMAS THOMASON, at Dr. Egan's Academy, the *Silver Medal,* for writing and conversing correctly and fluently in Latin.

Proficiency in Latin. To Master JOHN REDCROSS, at Dr. Egan's Academy, the *Silver Medal,* for writing and conversing correctly and fluently in Latin.

To Miss MARY LINWOOD, of Leicester, the *Silver Medal,* for submitting to the inspection of the Society, as examples of works of art, and of useful and elegant employment, three pieces of Needle-work, representing a Hare, still life, and a Head of King Lear, from a painting by Sir Joshua Reynolds.

To Miss EMMA JANE GREENLAND, Newman Street, the *Gold Pallet,* for communicating the ancient Grecian manner of painting. See the account, page 48.

To Mr. GRIFFITHS JAMES CHEESE, Organist of Man-

chester, the *Gold Medal*, for his improved Machine for teaching Blind Persons Music. See the account, and plate of his Machine, page 55.

To Mr. THEODORE ELLIOT, Lisson Green, the *lesser Silver Pallet*, for a painting of Shipping.

MANUFACTURES.

To Mr. WILLIAM LEPARD, Newgate Street, the *Silver Medal*, as a mark of the Society's approbation of his attempt to accomplish the intention of the Society, in offering the Premium for making in England or Wales, Paper for taking impressions from engraved copper-plates equal to that imported from France.

To Mr. LUKE GREEN, Marsham Street, Westminster, *Five Guineas*, for a new Manufacture of Caps, made of wool, and felted as for hats, but softer, and more elastic.

MECHANICS.

To a young Lad now abroad, whose name is yet unknown, *two Guineas*, for a small model of a ship, cut with a knife.

To Mr. WILLIAM RICH, Yalding, Kent, *three Guineas*, for a Nail and Bolt drawer. A more particular account of this Tool will be given in some future volume.

PRESENTS

RECEIVED BY THE SOCIETY,

IN THE YEAR 1786,

With the Names of the Donors.

BOOKS.

SAMUEL EWER, ESQ.

A COURSE of Experimental Philosophy, by I. T Desaguliers, F. R. S. 2 vols. quarto, third edition.

SOCIETY INSTITUTED AT BATH, FOR PROMOTING AGRICULTURE.

A Book of the Rules, and Orders, and Premiums, of the Society for promoting Agriculture at Bath.

WILLIAM FRANKLAND, ESQ.

The seventh volume of a work in French, entitled, Machines approuvées par l'Académie. Quarto.

N. B. The Society were before in possession of the six preceding volumes.

Mons. l'Abbe' Rozier.

Observations sur la Physique, &c. pour 1785.
Six numbers of the same work for 1786.
Mémoire de M. Demours, fils, Docteur Régent de la Faculté de Médecine de Paris.
Les Elans d'un Patriote.

Mons. Gaucher.

Essai sur l'Observation du Costume National relativement aux Arts.
Discours en vers sur la Société.

The Hon. A. Fraser.

Certain Arrangements in Civil Policy necessary for the further improvement of Mines, Husbandry, &c. Presented by the Author.

Mr. Richard Samuel.

Mathematical Sleaing Tables, or the great and only Mystery of weaving Linen Cloth, explained, &c.

Royal Society.

Three volumes of the Philosophical Transactions, for the years 1783, 1784, and 1785.

Mr. John Wilson of Manchester.

A Pamphlet entitled: An Essay on Light, and Colours,

and what colouring matters are that dye Cotton and Linen. Presented by the Author.

Mr. Francis Vispré.

A dissertation on the Growth of Wine in England. Presented by the Author.

Society instituted at Bath, for promoting Agriculture.

Letters and Papers on Agriculture, Planting, &c. selected from the Correspondence book of the Society instituted at Bath, for the encouragement of Agriculture, Arts, &c. volume 3d. 1786.

Mr. Richard Samuel.

A Pamphlet entitled, Remarks on the utility of Painting and Drawing, dedicated to the Society. Presented by the Author.

Arthur Young, Esq.

Annals of Agriculture, vols. IV. and V. Presented by the Author.

The Treaty of Navigation and Commerce between his Britannick Majesty and the most Christian King, signed 26th September, 1786.

PICTURES and PRINTS.

Mr. William Hincks.

A Miniature Portrait of Mr. William Shipley, the

founder of the Society, painted and presented by Mr. William Hincks.

Of this Portrait, an Engraving was made, and presented by the same Artist; a Print of which is affixed as the frontispiece to the fourth volume of these Transactions.

Mr. Robert Laurie.

Several Drawings taken from the Machines, &c: in the Society's Repository.

Mons. Gaucher, Engraver at Paris.

Five Prints. Le Prince Henry de Prusse—and le Comte de Vergennes—Jean François Marmontel—Charles M. I. B. du Paty,—and an emblematic Vignette.

MACHINES and MODELS.

Rev. James Cooke.

A large working model of a Drill Plough, and a new-constructed Hand Hoe, for which a patent has been granted. Presented by the Rev. James Cooke, the inventor. See an account of experiments made therewith, page 33.

Mr. Bream, of Yarmouth.

A model of a Boiler, for the use of Tallow-chandlers, and other Manufacturers of inflammable matters.

Mr. William Shipley.

Several light Garden Tools. These tools are designed

for the use of young Gentlemen and Ladies attentive to gardening; and are reserved in the Society's Repository, for the inspection of the publick.

Mr. John Horne.

A Patent universal Sowing Machine, for sowing broadcast, or drilling, fixed to a Kentish plough; presented by Mr. John Horne, the inventor.

William Walcot, Esq.

A Model of an improved Harpoon, for killing Whales.

Mr. Edmund Leach.

A Model of a Crane for Wharfs.

MISCELLANEOUS ARTICLES.

Thomas Boothby Parkyns, Esq.

A small box of seed of the plant called Racine de Disette. *See page* 24.

Mr. Cooke.

A small Gun Rammer, with an improved Sponge.

Mr. Peter Sidebotham.

An Alarum to give notice in case of Fire or Thieves, presented and fixed up in the Society's House.

Mr. Edward Johnson.

A Flush Chest handle.

CHARLES GOWER, ESQ.

A substitute for a Loaded Skewer, to be used in roasting meat.

Three boxes of Hemp Seed from China. Presented by the Directors of the Honourable East-India Company. *See page* 76.

A CATALOGUE

OF THE

MODELS AND MACHINES

Received since the publication of the Fourth Volume of the Society's Transactions ; with the Numbers as they are arranged in the Class to which they belong.

AGRICULTURE. CLASS I.

LXVI. A LARGE working Model of a new-invented Patent Drill Plough, presented by the Rev. James Cook, the inventor.

LXVII. A new-invented Patent universal Sowing Machine, for Broad-Cast or Drilling, presented by Mr. John Horne, the inventor.

LXVIII, to LXXIV. Several light Garden Tools, presented by William Shipley, Esq. the inventor. These Tools are designed for the use of young gentlemen and ladies attentive to gardening, and are reserved in the Society's Repository, for the inspection of the public.

LXXV. A new-invented Chaff Cutter, by Mr. James

Pike, for which he had a bounty of Twenty Guineas. *See page* 29.

CHEMISTRY. CLASS II.

IV. A model of a Turpentine Boiler, presented by Mr. Bream, of Yarmouth.

MANUFACTURES. CLASS III.

XXIV. A Cap, of a new Manufacture, by Mr. Luke Green, for which he had a bounty of Five Guineas.

MECHANICS. CLASS IV.

CI. A new-invented Handle for the conveniency of stowing Chests, and large Packing-cases or Boxes, on board Ships, presented by Mr. Edward Johnson.

CII. A model of an improved hand Harpoon, for killing Whales, presented by William Walcot, Esq.

CIII. A Nail and Bolt drawer, by Mr. William Rich, for which he had a bounty of Three Guineas.

CIV. An instrument for teaching blind persons Music, by Mr. Griffiths James Cheese, for which he had a bounty, the Gold Medal. *See page* 55.

CV. A trigonometrical instrument for measuring Angles, &c. by Mr. Mathew Hill, for which he had a bounty of five Guineas.

CVI. A small improved Rammer and Sponge, for a Gun, presented by Mr. Cooke.

CVII. A model of a Crane for Wharfs, presented by Mr. Edmund Leach.

CVIII. A substitute for a loaded skewer, to be used in roasting meat, presented by Charles Gower, Esq.

A LIST of the OFFICERS of the SOCIETY.

PRESIDENT,

Robert Lord ROMNEY, LL. D. F. R. S.

VICE-PRESIDENTS,

** Charles Duke of Richmond, &c. *F. R. S.*
** Hugh Duke of Northumberland,
** George Duke of Montagu, K. G. F. R. S.
** Jacob P. Earl of Radnor.

** Hon. Charles Marsham, *F. R. S.*
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* Edward Hooper, Esq. *F. R. S.*
* Owen Salusbury Brereton, Esq. *F. R & A. S.*
Sir Herbert Mackworth, *Bart. F. R. S.*
* James Davison, Esq.
P. William Dolben, *Bart.*
Sir Watkin Lewes, *Knight.*

CHAIRMEN OF COMMITTEES.

Elected March 22, 1787.

Accompts.

Mr. Hebert.
Mr. Wingfield.

Correspondence and Papers.

* Valentine Green, Esq. F. A. S.
Robert Dower, Esq.

Polite Arts.

Caleb Whitefoord, Esq.
John Parish Esq.

Agriculture.

Mr. Alexander Small,
John Pratt, Esq.

Manufactures.

Mr. Charles Smith.
Mr. John Baynes.

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* Samuel Ewer, Esq.

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Mr. Edward Kendrick.
Dr. Jackson.

Colonies and Trade.

Mr. John Samuel.
Edward Webster, Esq.

Miscellaneous Matters.

Mr. Joseph Jacob.
Mr. Abraham Hall.

Secretary ..... Mr. Samuel More.
Assistant-Secretary ..... Mr. Richard Samuel.
Registrar ..... Mr. George Cockings.

PREMIUMS

OFFERED IN 1787.

TO THE PUBLIC.

Adelphi Buildings,
April 11th, 1787.

THE chief objects of the attention of the Society for the Encouragement of Arts, Manufactures, and Commerce, in the application of their Rewards, are,

Ingenuity in the several branches of the Polite and Liberal Arts;

Useful discoveries and improvements in Agriculture, Manufactures, Mechanics, and Chemistry, or the laying open any such to the public;

And, in general,

All such useful inventions, discoveries, or improvements, (though not mentioned in the Book of Premiums) as may appear to have a tendency to the advantage of Trade and Commerce.

The Society, therefore, in pursuance of their plan, propose to bestow the following Premiums:

PREMIUMS FOR PLANTING AND HUSBANDRY.

Acorns.

1. For setting or sowing the greatest quantity of land, not less than ten acres, with Acorns, between the first day of October, 1786, and the first of January, 1787; and for fencing and preserving the same effectually, in order to raise timber; the Gold Medal.

2. For the second greatest quantity of land, not less than five acres, set or sown with acorns, agreeably to the above conditions; the Silver Medal.

Certificates of the setting or sowing, agreeably to the above conditions, and that there are not fewer than one thousand plants on each acre, to be produced to the Society, on or before the first Tuesday in November, 1787.

Acorns.

3. For sowing or setting, between the first of October, 1787, and the first of April, 1788, the greatest quantity of strong land, not less than ten acres, with Acorns, and seeds or cuttings of other trees; and for the effectually fencing and preserving the same, in order to raise timber and underwood; the Gold Medal.

4. For the second greatest quantity of land, not less than five acres, sown or set agreeably to the above conditions; the Silver Medal.

Certificates of setting or sowing agreeably to the above conditions, and that there are not fewer than three hundred young Oaks on each acre, to be delivered to the Society, on or before the first Tuesday in November, 1788.

5, 6. The same Premiums are extended one year further.

Certificates to be produced on or before the first Tuesday in November, 1789.

The same Premiums are extended one year further.

Certificates to be produced on or before the first Tuesday in November, 1790.

Raising Oaks.

7. To the person who shall raise the greatest number of Oaks, not fewer than five thousand, either from young plants, or from acorns, in woods, parks, or forests, that have long been under timber, and effectually fence and preserve the same, in order to secure a succession of oak timber in this kingdom; the Gold Medal.

8. For the next greatest quantity, not fewer than three thousand; the Silver Medal.

Certificates and accounts to be produced on or before the first Tuesday in January, 1788.

9, 10. The same Premiums are extended one year further.

Certificates to be produced on or before the first Tuesday in January, 1789.

11, 12. The same Premiums are extended one year further.

Certificates to be produced on or before the first Tuesday in January, 1790.

Chesnuts.

13. For setting or sowing the greatest quantity of land, not less than six acres, with Spanish Chesnuts, before the first of May, 1787, and for effectually fencing and preserving the same, in order to raise timber; the Gold Medal.

14. For the second greatest quantity, not less than four acres; the Silver Medal.

15. For the third greatest quantity, not less than two acres; the Silver Medal.

Certificates of setting or sowing agreeably to the above conditions (and that there are twelve hundred Spanish Chesnut plants, at least, on each acre) must be delivered to the Society on or before the first Tuesday in November, 1787.

Chesnuts.

16. For sowing or setting between the first of October, 1787, and the first of April, 1788, the greatest quantity of dry loamy land, not less than six acres, with a mixture of Spanish Chesnuts, and the seeds or cuttings of other trees adapted to such soil, and for effectually fencing and preserving the same, in order to raise timber; the Gold Medal.

17. For the second greatest quantity, not less than four acres; the Silver Medal.

Certificates of sowing or setting agreeably to the above conditions, and that there are not fewer than three hundred Chesnut plants on each acre, to be delivered

to the Society, on or before the first Tuesday in November, 1788.

18, 19. The same Premiums are extended one year further.

Certificates to be delivered on or before the first Tuesday in November, 1789.

20, 21. The same Premiums are extended one year further.

Certificates to be delivered on or before the first Tuesday in November, 1790.

Elm.

22. For planting the greatest number of the English Elm, not less than eight thousand, between the twenty-fourth of June, 1786, and the twenty-fourth of June, 1787, and for the effectually fencing and preserving the same, in order to raise timber; the Gold Medal.

23. For the second greatest number, not less than five thousand; the Silver Medal.

24. For the third greatest number, not less than four thousand; the Silver Medal.

Certificates of having planted agreeably to the above conditions, and specifying the distance of the trees, must be delivered to the Society, on or before the first Tuesday in November, 1787.

25, 26, 27. These same Premiums are extended one year further.

Certificates to be delivered on or before the first Tues- in November, 1788.

Larch.

28. For planting out, from the twenty-fourth of June, 1786, to the twenty-fourth of June, 1787, at a distance

not more than five feet, the greatest number of Larch-trees, not less than five thousand; the plants to be between two and four years old when planted out; and for effectually fencing and preserving the same, in order to raise timber; the Gold Medal.

29. For the second greatest number, not less than three thousand; the Silver Medal.

Certificates of planting according to the above conditions, to be delivered on or before the last Tuesday in November, 1787.

30, 31. The like Premiums will be given on the same conditions, for planting out Larch-trees, between the twenty-fourth of June, 1787, and the twenty-fourth of June, 1788.

Certificates to be produced on or before the last Tuesday in November, 1788.

Huntingdon Willow.

32. For the greatest number of acres, not less than three, planted in the year 1787, with Huntingdon Willows; the number of cuttings to be at least one thousand on each acre, properly fenced and secured; the Gold Medal.

Certificates to be produced on or before the last Tuesday in December, 1787.

Alder.

33. For the greatest number of acres, not less than six, planted in the year 1786 with Alders, to be at least one thousand on each acre, properly fenced and secured; the Gold Medal.

Certificates to be produced to the Society, on or be-

fore the last Tuesday in December, 1787, of the said planting, and that the trees were then growing on the land.

34. The same Premium is extended one year further.

Certificates to be produced on or before the last Tuesday in December, 1788.

Upland or Red Willow.

35. For the greatest number of acres, not less than three, planted, before the end of April, 1787, with Upland or Red Willow, properly fenced and secured, the number of plants on each acre to be at least twelve hundred; the Gold Medal.

Certificates to be produced onor before the last Tuesday in April, 1788.

It is well known that this species of willow thrives well on dry sandy land.

36. The same Premium is extended one year further.

Certificates to be produced on or before the last Tuesday in April, 1789.

Ash.

37. For planting the greatest number of acres, not less than six, in the year 1786, with Ash for timber; the plants to be at least two years old, properly secured and fenced; the number of plants on each acre to be at least twelve hundred; the Gold Medal.

38. For the next greatest number of acres, not less than four; the Silver Medal.

Certificates to be delivered on or before the second Tuesday in December, 1787.

39, 40. The same Premiums are extended one year further.

Certificates to be delivered on or before the second Tuesday in December, 1788.

Ash.

41. For sowing or setting in the year 1788, the greatest quantity of land not less than six acres, with Ash, for timber, intermixed with the seeds, cuttings or plants of such other trees as are adapted to the soil; the Gold Medal.

* 41. For the next greatest quantity, not less than four acres; the Silver Medal.

Certificates of the sowing or setting agreeably to the above conditions, and that there are not fewer than one hundred Ash plants on each acre, to be delivered to the Society on or before the last Tuesday in December, 1789.

42. The same Premium is extended one year further.

Certificates to be delivered on or before the last Tuesday in December, 1790.

Mixed Timber-Trees.

43. To the person who shall enclose and plant, or sow the greatest number of acres, not less than ten, with the best sorts of Forest-trees for timber, between the first of October, 1784, and the first of May, 1786, and shall deliver to the Society an account of the methods used in making the plantations, and of the nature of the soil, together with proper Certificates that the trees are then in a thriving condition on the land; the Gold Medal.

The Accounts and Certificates to be produced to the Society on or before the first Tuesday in November, 1788.

44. The same Premium is extended one year further.

The Accounts and Certificates to be produced on or before the first Tuesday in November, 1789.

45. The same Premium is extended one year further.

The Accounts and Certificates to be produced on or before the first Tuesday in November, 1790.

Mulberry Cuttings.

46. For raising the greatest number of white or black Mulberry trees, for feeding silk-worms, not less than three hundred, from cuttings, in the year 1785; the Gold Medal.

Certificates of the raising and growth, with the manner of culture, and that the plants were growing in September, 1778, to be produced on or before the first Tuesday in November, 1788.

Mulberry Cuttings.

47. To the person who shall form in the year 1785, the largest plantation, not less than one acre, of Mulberry-cuttings for the purpose of feeding silk-worms; the Gold Medal.

Certificates of the quantity of land and the method of culture; that the Mulberry plants are not more than three feet asunder, and that they were growing in the month of September, 1788, to be produced on or before the first Tuesday in December, 1788.

It is proposed that this plantation be continually kept in a low state, to the intent that the gathering the leaves may always be within the reach of women and children.

Mulberry Cuttings or Trees.

48. For planting the greatest number of white or black mulberry cuttings or trees, not fewer than three hundred, in the year 1787, for the purpose of feeding silk-worms; the Gold Medal.

49. For the second greatest quantity, not fewer than one hundred and fifty; the Silver Medal.

Certificates of such planting, with the manner of culture, and that the trees were growing in the month of July, 1789, to be produced to the Society on or before the first Tuesday in November, 1789.

Mulberry-trees in Hedge-rows.

50. To the person who shall plant in the year 1788, the greatest number, not fewer than one hundred layers of the black or white mulberry, in hedge rows, at a distance not less than twelve feet from each other; Ten pounds.

51. For the next greatest number, not fewer than fifty; Five Pounds.

Certificates of the number of plants, and that the trees were then in a growing state, to be delivered to the Society, on or before the first Tuesday in October, 1789.

*** The Candidates for planting all kinds of trees, are to certify, that the respective plantations are properly fenced and secured, and particularly to state the condition the plants were in, at the time of signing such certificates.

Any information which the Candidates for the foregoing premiums may choose to communicate, relative to the methods made use of in forming the plantations or promoting the growth of the several

trees, or any other observations that may have occurred on the subject, will be thankfully received.

Trees for use when exposed to the Weather.

52. To the person who shall send the most satisfactory account, verified by experiments, to determine which of the following trees is of the greatest utility for timber or poles, for use when exposed to the weather, viz.

Larch,	Black-poplar,
Ash,	Spanish-chesnut,
Willow,	Alder,
Lombardy-poplar,	Beech ;

The Gold Medal.

The Accounts to be produced on or before the second Tuesday in December, 1787.

53. The same Premium is extended one year further.

The Accounts to be produced on or before the second Tuesday in December, 1788.

Preserving Acorns.

54. To the person who shall produce to the Society the most effectual method of preventing Acorns, when sown or planted for timber, being injured by mice ; the Gold Medal.

The Accounts verified by actual experiments, with proper Certificates that the methods made use of have been fully sufficient for the purpose, to be produced on or before the last Tuesday in November, 1787.

Preserving Chesnuts, and Seeds of other Forest Trees.

55. To the person who shall produce to the Society,

the most effectual method of preventing Chesnuts, and the seeds of other Forest Trees, when sown or planted for timber, being destroyed by mice; the Silver Medal.

The Accounts verified by actual experiments, with proper Certificates that the methods made use of have been fully sufficient for the purpose, to be produced on or before the last Tuesday in November, 1787.

Planting Boggy or Morassy Soils.

56. For an account of the best set of experiments sent by the planter, or his representative, to ascertain the comparative advantages of planting boggy or morassy soils, with white-poplar, black-poplar, Lombardy-poplar, and willow; the Gold Medal.

It is required that not less than half an acre be planted with each, and the plants to be not more than four feet asunder.

It is also required that the plantation stand fourteen years; at the end of which, to be all cut down and measured, or accurately measured standing. The Certificates of the measure and value, and that the whole is properly fenced and secured, to be produced on or before the first Tuesday in January, 1792.

N. B. Any information relating to the state of the plantation, if sent to the Society, between the time of planting and claiming the Premium, will be thankfully received.

57. The same Premium is extended one year further.

Certificates to be produced on or before the first Tuesday in January, 1793.

58. The same Premium is extended one year further.

Certificates to be produced on or before the first Tuesday in January, 1794.

59. The same Premium is extended to the year 1796.
Certificates to be produced on or before the first Tuesday in January, 1797.

60. The same Premium is extended one year further.
Certificates to be produced on or before the first Tuesday in January, 1798.

Roots of Corn.

61. To the person who shall ascertain from observation, and by experiment, the succession of the different Roots of Corn (distinguishing the times when such succession of roots takes place), particularly those which shoot out at or near the time the plants go into ear; showing also from facts, the injury arising from the failure of those particular roots, and the most effectual means of preventing such misfortune; the Gold Medal.

To be produced on or before the first Tuesday in January, 1788.

N. B. This Premium is extended to Scotland and Ireland.

Comparative Culture of Wheat.

62. For the best set of experiments on not less than six acres of land, to ascertain whether it is most advantageous to cultivate Wheat, by sowing it in the common broad-cast way, by drilling it in equi-distant rows, or by dibbling, hoeing the intervals; the Gold Medal.

It is required that the distance between the rows, may not exceed eleven inches, and that an account of the nature and condition of the land on which the experiments are made, together with an account of the produce of the Corn, be produced to the Society, on or before the first Tuesday in February, 1788.

Comparative Culture of Wheat.

63. For the best set of experiments, made on not less than eight acres, four of which to be sown broad-cast and four drilled, to ascertain whether it is most advantageous to cultivate Wheat, by sowing it in the common broad-cast way, or by drilling it in equi-distant rows, hoeing the intervals ; the Gold Medal.

It is required that an account of the nature and condition of the land on which the experiments are made, together with an account of the produce of the corn, be produced to the Society on or before the first Tuesday in February, 1788.

64. The same Premium is extended one year further. The Accounts to be produced to the Society on or before the first Tuesday in February, 1789.

Comparative Culture of Wheat.

65. For the best set of experiments, made on not less than eight acres of land, four of which to be sown broad-cast, and four dibbled, to ascertain whether it is most advantageous to cultivate Wheat, by sowing it in the common broad-cast way, or by dibbling it in equi-distant rows, hoeing the intervals ; the Gold Medal.

It is required that an account of the nature and condition of the land on which the experiments are made, together with an account of the produce of the corn, be produced to the Society on or before the first Tuesday in February, 1788.

66. The same Premium is extended one year further. The Accounts to be produced to the Society on or before the first Tuesday in February, 1789.

Beans and Wheat.

67 To the person who shall plant or drill between the first of December, 1785, and the first of March, 1786, the greatest quantity of land, not less than ten acres, with Beans, and shall sow the same land with Wheat in the same year, 1786; Ten Guineas.

It is required that an Account of the sort and quantity of Beans, the time of planting or drilling, and of reaping or mowing them, the produce per acre threshed, the application of the straw, the expense of planting or drilling, hand or horse hoeing, the distance of rows, and the quality of the soil, together with Certificates of the number of acres, and that the land was actually sown with Wheat in the year 1786, to be produced on or before the first Tuesday in November, 1787.

N. B. The Society have been informed that Beans may be drilled or planted so early as the month of December, from whence may be derived the advantage of an early harvest; in which case, the straw will be far more valuable than that from a later planting or drilling.

68. The same Premium is extended one year further. The Accounts to be produced on or before the first Tuesday in November, 1788.

Turnips.

69. For the best account of experiments, made on at least six acres of land, to determine the comparative advantages of the drill or broad-cast method in the cultivation of Turnips; the Gold Medal.

The Accounts to be delivered in, on or before the third Tuesday in April, 1788.

70. The same Premium is extended one year further.

The Accounts to be delivered on or before the third Tuesday in April, 1789.

Green Vegetable Food.

71. For the best account, confirmed by experiments, of the vegetable Food (cabbages and turnips excepted) growing in the months of March and April, that will most increase the milk in mares, cows, and ewes, at that season ; provided such food can be cultivated at an expense that will admit of its being applied to the above purposes ; the Gold Medal.

Certificates to be produced on or before the second Tuesday in November, 1787.

72. The same Premium is extended one year further.

Certificates to be produced on or before the second Tuesday in November, 1788.

Turnip-Rooted Cabbage.

73. For raising and having duly cultivated Turnip-rooted Cabbage, in the year 1785, for the feeding cattle or sheep on the greatest number of acres, not less than ten, and giving an account of the soil, culture, time, and manner of feeding off, produce, and the effects on cattle or sheep fed with it ; Ten Guineas.

74. For the next greatest number of acres, not less than five ; Five Guineas.

Certificates of the quantity of land, with the Accounts, to be produced on or before the last Tuesday in October, 1787.

Turnip-Rooted Cabbage.

75. For raising, and having duly cultivated Turnip-

rooted Cabbage, in the year 1786, for the feeding cattle or sheep, on the greatest number of acres, not less than ten, and giving an account of the soil, culture, time, and manner of feeding off, produce, and the effects on cattle or sheep fed with it; the Gold Medal.

76. For the next greatest number of acres, not less than five; the Silver Medal.

Certificates of the quantity of land, with the Accounts, to be produced on or before the last Tuesday in October, 1788.

Potatoes for Feeding Cattle and Sheep.

77. To the person who shall, in the year 1788, cultivate the greatest quantity of land, not less than four acres, with potatoes, for the sole purpose of feeding cattle and sheep; the Gold Medal, or Twenty Guineas.

Certificates, with satisfactory accounts of the expense and manner of cultivating the potatoes, and the application of them to the above purposes, and the success that has attended the use of them, to be delivered to the Society on or before the second Tuesday in November, 1789.

N. B. Should any gentleman have already cultivated Potatoes for the purposes mentioned in the above advertisement; any information from him on the subject will be thankfully received by the Society.

Cultivating Roots and Herbage for Feeding Sheep and Black Cattle.

78. For the most satisfactory experiments made between Michaelmas, 1786, and the first of May, 1787, in order to ascertain which of the following plants can be

cultivated and housed, or otherwise secured for winter fodder, to the greatest advantage, viz.

Turnip-rooted Cabbage,	Carrots,
Turnip Cabbage,	Parsnips,
Turnips,	Potatoes;

The Accounts to be produced on or before the first Tuesday in November, 1787; the Gold Medal.

It is required that the above roots be taken off the land by the last day of October, 1786; that a crop of wheat may be sown in the same ground, and the particulars of the sowing and planting, taking up, produce, preserving, and application to the feeding Sheep and Black Cattle, be specified. The comparative experiments must be made between two or more of any of the above-mentioned plants, and not less than two acres be cultivated with each particular kind of plant.

N. B. Great advantage will arise to the farmer occupying land in the neighbourhood of extensive commons from the conveniency of keeping large flocks of sheep and herds of cattle, if the difficulty of supporting them through the winter was obviated by a due knowledge of this practice.

79. The same Premium is extended one year further.

Certificates to be produced on or before the first Tuesday in November, 1788.

Stocks of Bees.

80. To the person who shall have in his possession, being his own property, the greatest number of Stocks of Bees, not fewer than thirty, and who shall in the most judicious manner provide for them plenty of such vegetables as afford them honey and wax; the Gold Medal, or Twenty Pounds.

81. For the next greatest number, not fewer than twenty stocks; the Silver Medal, or Ten pounds.

Proper Certificates of the number of Stocks, and that they have been in the possession of the claimant during the preceding summer, together with a particular account of the vegetables provided for their sustenance, and the manner in which they have been managed, to be produced to the Society on or before the first Tuesday in November, 1789.

Cultivating the True Rhubarb.

82. For raising, before the end of the year 1787, the greatest number of plants, not less than three hundred, of Rheum Palmatum, or true Rhubarb; the Gold Medal.

83. For the next greatest quantity, not less than two hundred plants; the Silver Medal.

Certificates of the number of plants, that they stand at least four feet asunder, that they have been in a thriving state during the preceding summer, with an account of the soil, culture, and aspect, to be produced on or before the second Tuesday in Febuary, 1788.

84, 85. The same Premiums are extended one year further.

Certificates to be produced on or before the second Tuesday in February, 1789.

Rhubarb.

86. For the greatest quantity of Rhubarb of British growth, not less than twenty pounds weight, equal to such as is commonly sold in the shops, under the name of Turkey or Russia Rhubarb; five pounds of which to be

produced as a sample, with certificates that the remainder is of equal goodness, and a particular account of the manner of culture and cure, on or before the first Tuesday in November, 1787: the Gold Medal.

87. For the next greatest quantity, not less than ten pounds weight; the Silver Medal.

88, 89. The same Premiums are extended one year further. The Samples and Certificates to be produced on or before the first Tuesday in November, 1788.

Ascertaining the Component Parts of Arable Land.

90. To the person who shall produce to the Society the most satisfactory set of experiments, to ascertain the due proportion of the several component parts of Arable Land, in one or more counties in Great Britain, by an accurate analysis of it, and who having made a like analysis of some poor land, shall by comparing the component parts of each, and thereby ascertaining the deficiencies in the poor soil, improve a quantity of it, not less than two acres, by the addition of such parts as the former experiments shall have discovered to be wanting therein, and therefore probably the cause of its sterility; the Gold Medal.

It is required that the manurings, ploughings, and crops of the improved land, be the same after the improvement as before; and that a minute account of the produce in each state, of the weather, and the various influencing circumstances, together with the method made use of in analysing the soils, be produced, with proper certificates, and the chymical results of the analysis, which are to remain the property of the Society, on or before the last Tuesday in November, 1788.

It is expected that a quantity, not less than six pounds, of the rich, of the poor and of the improved soils, be produced with the certificates.

N. B. Among the methods of processes made use of by Chemists, and called *dry* or *moist*, the latter only appears adapted to the ascertaining the respective proportions of the component parts of Arable Earth.—Dr. Shaw, in his Chymical Lectures—Dr. Home, in his Principles of Agriculture.—Dr. George Fordyce, in his Elements of Agriculture; and Sir Torbern Bergman, in his *Dissertation sur les Terres géoponiques*, have treated of these subjects.

91. The same Premium is extended one year further. The Accounts to be produced on or before the last Tuesday in November, 1789.

92. The same Premium is extended one year further. The Accounts to be produced on or before the last Tuesday in November, 1790.

93. The same Premium is extended one year further. The Accounts to be produced on or before the last Tuesday in November, 1791.

94. The same Premium is extended one year further. The Accounts to be produced on or before the last Tuesday in November, 1792.

Improving Land lying waste.

95. For the best account of a method of improving any of the following soils, being land lying waste or uncultivated, viz. clay, gravel, sand, chalk, moor, or peat-earth, and bog; verified by experiments on not less than ten acres of land, to be produced on or before the second Tuesday in December, 1787; the Gold Medal for each.

96. For the next in merit; the Silver Medal.

The soil, manner of improvement, expense, and product, are required to be fully explained.

97, 98. The same Premiums are extended one year further.

The Accounts to be produced on or before the second Tuesday in December, 1788.

99, 100. The same Premiums are extended one year further.

The Accounts to be produced on or before the second Tuesday in December, 1789.

Manures.

101. To the person who shall give the most satisfactory account, verified by accurate experiments, on what soil the application of marl, chalk, lime, or clay severally as manures, be the most beneficial; the Gold Medal.

It is required that each experiment be made on one acre, and that they be continued four years, the same kind of grain being sown the same year on the several spots.

It is also required, that if different manures are compared, the experiments be made on similar soils, lying near each other.

An Account of the nature of the soil, manure, and the quantity laid on, with all expenses and crops, to be delivered, with specimens of the soil and manure, on or before the first Tuesday in January, 1788.

102. The same Premium is extended one year further.

The Accounts and Specimens to be produced on or before the first Tuesday in January, 1789.

103. The same Premium is extended one year further.

The Accounts and specimens to be produced on or before the first Tuesday in January, 1790.

Manures.

104. For the most satisfactory set of experiments, to ascertain the comparative advantage of the following Manures, used as top-dressings, on grass or corn land, viz. soot, coal-ashes, wood-ashes, lime, night-soil; the Gold-Medal.

It is required that not less than half an acre of land be appropriated to each manure, the soils similar, and lying near each other; and if the manure be used on corn land, then it is required that the same kind of grain be sown the same year on each spot; the experiments to be continued not less than two years.

An Account of the nature of the soil, quantity, and expense of the manure and crops, with certificates, to be produced on or before the first Tuesday in December, 1787.

105. The same premium is extended one year further.

The Account and Certificates to be produced on or before the first Tuesday in December, 1788.

Course of Crops on Strong Land.

106. For the most satisfactory account, verified by experiments, made on not less than five acres of clay, or wet loam, to ascertain the advantages of the following course of crops, viz. first, beans drilled, or planted and hoed, secondly, wheat; the Gold Medal.

These experiments to be continued two courses, or four years.

Certificates, with an account of the soil, culture, and quantity of manure, if any laid on, to be produced on or before the last Tuesday in March, 1788.

N. B. The success of this course of crops much de-

pending on the land being kept entirely clean, it is expected that each crop of the Beans be horse-hoed or hand-hoed at least three times.

Improving Waste Moors.

107. For the improvement of the greatest number of acres of Waste Moor Land, not less than one hundred; the Gold Medal.

It is required that the land, before improvement, be absolutely uncultivated, and in a great measure useless, not let to any tenant, and without any building upon it except cottages or huts; that, in its improved state, it shall be enclosed, cultivated, and divided into fields, with buildings erected thereon, sufficient for the use and residence of a tenant.

Certificates of the number of acres, of the quality of the moor so improved, of the mode and expense of the improvement, the state it is in as to the proportion of grass to arable, and the rent at which it is let, to be produced on or before the first Tuesday in February, 1788.

108. The same Premium is extended one year further. Certificates to be produced on or before the first Tuesday in February, 1789.

109. The same Premium is extended one year further. Certificates to be produced on or before the first Tuesday in February, 1790.

Gaining Land from the Sea.

110. To the person who shall produce to the Society, an account of the best method, verified by actual experiment, of gaining Land from the Sea, not less than

twenty acres, on the coast of England or Wales; the Gold Medal.

Certificates of the quantity of land, and that the experiments were begun after the first of January, 1782, to be produced to the society on or before the first Tuesday in October, 1787.

N. B. The Society have been credibly informed, that land has been gained on the coast of Holland, by fixing rows of wisps of straw upright in the sand, at about a foot distant from each other, or by fixing stakes at proper distances from each other, and wattling straw-bands between them.

111. The same Premium is extended one year further.

Certificates to be produced on or before the first Tuesday in October, 1788.

112. The same Premium is extended one year further.

Certificates to be produced on or before the first Tuesday in October, 1789.

113. The same Premium is extended one year further.

Certificates to be produced on or before the first Tuesday in October, 1790.

114. The same Premium is extended one year further.

Certificates to be produced on or before the first Tuesday in October, 1791.

Machine to answer the Purpose of Reaping or Mowing Corn.

115. For inventing a machine to answer the purpose of mowing or reaping wheat, rye, barley, oats, or beans, by which it may be done more expeditiously and cheaper, than by any method now practised, provided it does not shed the corn, or pulse, more than the methods in common practice, and that it lays the straw in such manner as may be easily gathered up for binding; Ten Guineas.

The machine, with certificates that at least three acres have been cut by it, to be produced to the Society on or before the second Tuesday in December, 1787.

Simplicity and cheapness in the construction, will be considered as principal parts of its merit.

Curing scab in Sheep.

116. To the person who shall discover to the Society the most efficacious method of curing the disorder called the *Scab in Sheep*, verified by repeated trials; the Silver Medal, or Ten Guineas.

Certificates of different cures, with a description of the disease, and a particular account of the method or recipe, and the manner of using it to be delivered to the Society, on or before the second Tuesday in January, 1788.

Destroying the Grub of the Cockchafer.

117. To the person who shall discover to the Society an effectual method, verified by repeated and satisfactory trials, of destroying the Grub of the Cockchafer, so destructive to the roots of all sorts of corn, peas, beans, and turnips; the Gold Medal.

The Accounts to be produced on or before the first Tuesday in January, 1788.

PREMIUMS FOR DISCOVERIES AND IMPROVEMENTS IN CHEMISTRY, DYING, AND MINERALOGY.

Kelp.

118. For the greatest quantity, not less than four tons, of Kelp, containing a much larger proportion of Alkaline salt than any kelp now made for sale; Twenty Pounds.

A Specimen of one hundred weight to be produced on or before the first Tuesday in January, 1788; together with Certificates that the whole quantity is equal to the specimen, and made in Great Britain or Ireland, of sea-weed.

Barilla.

119. For the greatest quantity of merchantable Barilla, not less than half a ton, made from Spanish Kali, raised in Great Britain; the Gold Medal.

A sample of not less than twenty-eight pounds, with a Certificate that half a ton has been made, to be produced on or before the first Tuesday in January, 1788.

Dissertation on Alkali.

120. To the person who shall compose the best dissertation on the nature and qualities of vegetable and

mineral Alkali, containing an account of their analogy to each other, and of the most essential properties wherein they differ; together with any useful remarks that may have escaped the notice of chemical writers, explaining also the means of separating them from each other, but more particularly from sea salt, or other neutral salts which are frequently found united with them; so that, when purified, they may be advantageously used in such manufactures wherein the admixture of neutral salts is detrimental; lastly, an investigation into the nature of their composition, and the method of decompounding them into their constituent principles; The Gold medal, or Fifty Pounds.

The Dissertation to be produced to the Society on or before the first Tuesday in March, 1788.

Preserving Seeds of Vegetables.

121. For the best method of preserving the seeds of plants in a state fit for vegetation, a longer time than has hitherto been practised; such method being superior to any known to the public, and verified by sufficient trial; to be communicated to the Society on or before the first Tuesday in December, 1787; the Gold Medal.

Destroying Smoke.

122. For the best account, ascertained by proper experiments, of a method of destroying or burning the smoke of fires belonging to steam-engines, furnaces employed in calcining or smelting metals, or other large works, in order to prevent annoyance to the neighbourhood; to be produced on or before the first Tuesday in January, 1788; the Gold Medal.

Candles from Resin.

123. To the person who shall discover to the Society, the best method of so reducing the inflammable quality of Resin, as to adapt it to the purposes of making Candles fit for common use, at a price much inferior to that of Candles made of tallow only; the Gold Medal, or Thirty Guineas.

Six pounds at least of the Candles so prepared, with an account of the process, to be delivered to the Society on or before the first Tuesday in December, 1787.

Substitute for, or Preparation of Yeast.

124. For discovering to the Society an effectual substitute for yeast, or preparation of yeast, which, after being kept two months, shall be fit for fermenting liquors, and raising bread; the Gold Medal, or Twenty pounds.

Specimens of the substitute, or of the preparation of Yeast, sufficient for trials, together with a paper sealed up, and containing an account of the composition of the Substitute, or method of preparing the Yeast, to be produced on or before the last Tuesday in November, 1787.

Increasing Steam.

125. To any person who shall discover to the Society, a method, verified by actual experiments, of increasing the quantity, or the force of Steam, in steam engines, with less fuel than is usually employed, provided that in general the whole amount of the expenses in using steam engines may be considerably lessened; the Gold Medal.

To be communicated to the Society on or before the first Tuesday in January, 1788.

N. B. As it is well known there are methods of preventing the ebullition of liquids, by the addition of particular matters in the boiling, it is submitted to the consideration of the ingenious, whether by the addition of some matters, or by some mechanical operations, the boiling and evaporation may not be increased.

126. The same Premium is extended one year further.

To be Communicated to the Society on or before the first Tuesday in January, 1789.

Method of Comparing Sweets.

127. To the person who shall discover to the Society an Index or practical method of comparing, measuring, and ascertaining the degrees of sweetness in saccharine substances; the Gold Medal.

To be produced on or before the first Tuesday in January, 1788.

Preventing the Dry Rot in Timber.

128. To the person who shall discover to the Society, the cause of the Dry Rot in timber, and disclose a certain method of prevention, superior to any hitherto known; the Gold Medal.

The Accounts of the cause and method of prevention, confirmed by repeated experiments, to be produced to the Society on or before the second Tuesday in December, 1787.

129. The same Premium is extended one year further.

The Accounts to be produced on or before the second Tuesday in December, 1788.

Bronze for Copper Medals.

130. To the person who shall discover to the Society a method of bronzing copper medals, equal to that practised in France ; the Gold Medal.

To be produced to the Society on or before the second Tuesday in December, 1787.

Fine Bar Iron.

131. To the person, in England or Wales, who shall make, in the year 1788, the greatest quantity of Bar Iron, not less than ten tons, with coak from coak pigs, equal in quality to the best Iron imported from Sweden or Russia, and as fit for converting into steel ; the Gold Medal.

Samples, not less than one hundred weight, with Certificates that the whole quantity is of equal quality, to be produced to the Society on or before the first Tuesday in January, 1789.

PREMIUMS FOR PROMOTING THE POLITE ARTS.

Honorary Premiums for Drawings.

132. For the best Drawing of any kind, made with crayons, chalk, black-lead, pen, Indian ink, or bister, by young gentlemen under the age of twenty-one, sons or grandsons of Peers or Peeresses in their own right, of Great Britain or Ireland; to be produced on or before the first Tuesday in March, 1788; the Honorary Medal of the Society in Gold.

133. The same in Silver, for the second in merit.

134, 135. The same Premiums will be given, on the like conditions, to young ladies, daughters or grand-daughters of Peers or Peeresses in their own right, of Great Britain or Ireland.

Honorary Premiums for Drawings.

136. For the best Drawing of any kind, made with crayons chalk, black-lead, pen, Indian ink, or bister, by young gentlemen under the age of twenty-one; the Gold Medal.

To be produced on or before the first Tuesday in March, 1788.

137. For the next in merit; the Silver Medal.

138, 139. The same Premiums will be given for Drawings by young ladies.

N. B. Persons professing any branch of the Polite Arts, or any business dependant on the arts of Design, or the sons or daughters of such persons, will not be admitted candidates in these classes.

The following PREMIUM *is offered in conformity to the Will of the late* JOHN STOCK, *of Hampstead, Esq.*

Sculpture.

140. For the best model of the Bust of his Royal Highness the Prince of Wales, as large as the life; to be produced on or before the third Tuesday in November, 1787; a Silver Medallion, with the following engraved inscription: "The Premium given by the Society for "the Encouragement of Arts, Manufactures and Com- "merce, in conformity to the Will of John Stock, of "Hampstead, Esq."

A cast from the Model to which the Premium is adjudged, is to remain the property of the Society.

Drawings of Outlines.

141. For the best Outline after an original group or cast in plaster of human figures, by persons of either sex under the age of sixteen, the principal figure not less than twelve inches; to be produced on or before the last Tuesday in November, 1787; the greater Silver Pallet.

142. For the next in merit; the lesser Silver Pallet.

N. B. These Drawings are to be made on paper with chalk, black-lead, Indian ink, or bister; and the

originals either to be produced to the Society or to be referred to for their examination.

Drawings of Machines.

143. For the best perspective drawing, by persons of either sex, under the age of twenty-one years, of the model of a crane by Mr. Bunce, in the Society's Repository, shewing particularly the method of stopping the wheel by the centrifugal force of the ball; the greater Silver Pallet; to be produced on or before the third Tuesday in November, 1787.

N. B. Such Candidates as propose to make drawings for this Premium, will be admitted by the Register any day (Sundays or Wednesdays excepted) between the hours of ten and two.

The drawing to which the Premium is adjudged is to remain the property of the Society.

Drawings of Landscapes.

144. For the best drawing of Landscapes after nature, by persons of either sex, under twenty-one years of age, to be produced on or before the third Tuesday in November, 1787; the greater Silver Pallet.

145. For the next in merit; the lesser Silver Pallet.

Each Candidate must mention, on the front of his drawing, from whence he took his view; and the drawings must be made with chalk, pen, Indian ink, or bister.

Historical Drawings.

146. For the best historical drawing, being an original composition of five or more human figures; the height of

the principal figure not less than eight inches; to be made with crayons, chalk, black lead, pen, Indian ink, or bister; and to be produced on or before the third Tuesday in November, 1787; the Gold Pallet.

147. For the next in merit; the greater Silver Pallet.

Engraving in the Line Manner.

148. To the engraver who shall produce to the Society, the best engraved plate, executed by himself, of the dimensions of not less than twenty inches by sixteen inches, containing not fewer than three human figures, the principal figure not less than twelve inches high; to be engraved in the *Line Manner*, from any old or modern picture, the plate to be published by the engraver.

The regular progress of the work, from the first proof of the etching, to the finished impression of the plate, to be produced to the Society on or before the first Tuesday in February, 1789; the Gold Pallet, or Twenty-five Guineas.

149. The same Premium is extended one year further.

The Impressions to be delivered on or before the first Tuesday in February, 1790.

Surveys of Counties.

150. To the person who, in the year 1791, shall compleat and publish an accurate survey of any one county in England or Wales, on a scale of not less than one inch to a mile, for which rewards have not already been given by the Society; the Gold Medal, or Fifty Pounds.

Certificates of the accuracy of the survey, and that it was begun after the first of June, 1787, together with the map, to be produced on or before the last Tuesday in January, 1792.

The map to which the Premium shall be adjudged, to remain the property of the Society.

N. B. The Society are already in possession of surveys of the following counties, viz. Devonshire, Derbyshire, Somersetshire, Northumberland, Suffolk, Leicestershire, Cumberland, and Lancashire.

CONDITIONS.

No person who has gained the first Premium in any class, will be admitted a Candidate in a class of an inferior age; and no Candidate shall receive more than one Premium in one year; nor will they who, for two successive years, shall gain the first Premium in one class, be ever again admitted as Candidates in that class.

No person shall ever be admitted a Candidate in any class in which he has three times obtained the whole of the first Premium.

No Candidate shall send in more than one performance in any one class.

All the claims which are produced each year, before the Committee of Polite Arts (to which Premiums or bounties are adjudged) are to remain with the Society six weeks after the determination, unless the Candidates, for particular reasons, do apply to have the performances returned.

No claim for a Premium in the Polite Arts will be admitted, that has obtained, or has been produced in order to obtain a Premium, reward or gratification from any other Society, or any academy or school.

All performances that obtain Premiums in the Polite Arts, must be begun after the publication of such Premiums.

Purposely to encourage real merit, and to prevent any attempts to impose on the Society, by producing drawings which shall have been made or retouched by any other person than the Candidate, the Society is resolved upon all occasions, with respect to the successful candidates in classes 141 to 146 inclusive, to prove their abilities, by requiring a specimen made under the inspection of the Committee of Polite Arts, in every instance where such proof can be obtained.

PREMIUMS FOR ENCOURAGING AND IMPROVING MANUFACTURES.

Silk.

151. For the greatest quantity of merchantable Silk, not less than five pounds, produced by any one person in England, in the year 1787 ; the Gold Medal.

Specimens of the Silk, not less than one pound, with Certificates that the whole is of equal quality, and produced in England, to be delivered to the Society on or before the first Tuesday in January, 1788.

152. For the second greatest quantity, not less than two pounds; the Silver Medal.

Machine for Carding Silk.

153. For the best Machine, superior to any now in use, for Carding waste Silk equally well as by hand; to be produced, together with a specimen of the Cardings,

on or before the first Tuesday in November, 1787; the Gold Medal, or Twenty Pounds.

Weaving Fishing Nets.

154. For the best specimen of plain netting, for Fishing Nets, not less than twenty yards long, and six feet deep, woven in a loom, or other machine; to be produced to the Society on or before the second Tuesday in January, 1788; Twenty Guineas.

N. B. It is expected that the specimen produced, be made in such a manner, as to be cut and joined without more loss than usual, that it have such a plain selvage as the common fishing nets, and that the knot be equally fast with those in nets in common use, and as easily repaired.

Paper for Copper-Plates.

155. To the person who shall establish in England or Wales, a manufacture of Paper, superior to any hitherto made, proper for receiving impressions from Mezzotinto, and other engraved Copper-plates, and produce to the Society, one ream of the dimensions of *French colombier*, on or before the first Tuesday in November, 1787; the Gold Medal.

Certificates must be produced, to the satisfaction of the Society, that the Paper was made in England or Wales.

Cloth from Hop-Stalks.

156. A strong Cloth being prepared in Sweden, from Hop-stalks or Binds, the Society will give the Gold Medal, or Twenty Pounds, as a Premium for the best and greatest quantity of such Cloth, not less than twenty-

five yards, made in England, and produced to the Society on or before the second Tuesday in December, 1787.

One pound at least of the Thread to be produced with the claim.

157. The same Premium is extended one year further.

The Cloth and Thread to be produced to the Society on or before the second Tuesday in December, 1788.

158. The same Premium is extended one year further.

The Cloth and Thread to be produced to the Society on or before the second Tuesday in December, 1789.

Paper from Vegetable Substances not previously made into Cloth.

159. To the person in England or Wales, who shall make the greatest quantity, not less than ten reams, of the best and most useful paper from vegetable substances that have not been previously made into cloth; Ten Guineas.

Certificates of the making such paper, and one ream of the paper, to be produced on or before the first Tuesday in November, 1788.

N. B. The Society are in possession of two volumes, containing a great variety of specimens of paper made from raw vegetables, viz. thistles, potatoe-haum, poplar, hop binds, &c. which volumes may be inspected by any person on application to the Register.

PREMIUMS FOR INVENTIONS IN MECHANICS.

Transit Instrument.

160. To the person who shall invent and produce to the Society, a cheap and portable Transit Instrument, which may easily be converted into a zenith sector, capable of being accurately and expeditiously adjusted for the purposes of finding the latitudes and longitudes of places, and superior to any portable Transit Instrument now in use; the Gold Medal, or Twenty Guineas.

To be produced on or before the last Tuesday in January, 1788.

Gun Harpoon.

161. For every whale taken by means of the Gun Harpoon; to the person who first strikes such fish therewith; Two Guineas.

N. B. Proper Certificates of the taking such whales, in the year 1787, signed by the master, or by the mate when the claim is made by the master, to be delivered to the Society on or before the last Tuesday in December, 1787.

Gun for throwing Harpoons.

162. To the person who shall produce to the Society, the best improvement in the construction of a Gun for throwing Harpoons, so as to render it more manageable than those at present in use; the Silver Medal, or Ten Guineas.

The Gun to be produced to the Society on or before the first Tuesday in December, 1787.

Harpoon to be thrown by a Gun.

163. To the person who shall produce to the Society, the best improvement in the construction of a Harpoon to be thrown by a Gun; the Harpoon to be so contrived, that it may strike and hold the fish with more certainty and greater effect than any hitherto made use of; the Silver Medal, or Ten Guineas.

The Harpoon to be produced to the Society on or before the first Tuesday in December, 1787.

Cross Bow, or other instrument for throwing Harpoons.

164. To the person who shall produce to the Society, the best-constructed Cross-Bow, or other instrument to be used in the whale fishery for throwing Harpoons, with more advantage and greater effect than the gun, or any other instrument now in use; the Silver Medal, or Ten Guineas.

To be delivered to the Society on or before the first Tuesday in December, 1787.

Cross Bow Harpoon.

165. For every whale taken by means of a Harpoon, shot from a Cross-Bow ; to the person who first strikes such fish therewith ; Two Guineas.

Proper Certificates of the taking such whales in the year 1787, signed by the master, or by the mate when the claim is made by the master, to be delivered to the Society on or before the last Tuesday in December, 1787.

Machine for transporting Timber.

166. To the person who shall produce to the Society a model of the best, most simple, and cheap machine or carriage for transporting Timber, or other heavy materials, on soft or clayey roads, at the least expense, to be sent in on or before the last Tuesday in November, 1787 ; Twenty Guineas.

Improvement of the Hand Ventilator.

167. To the person who shall produce to the Society, on or before the last Tuesday in February, 1788, a portable Ventilator, to be worked by hand, better adapted and more efficacious for extracting foul air from gaols, prisons, and ships, than any now known or in use ; the Gold Medal, or Twenty Guineas.

Cranes for Wharfs.

168. To the person who shall invent and produce to the Society, a model of a Crane for Wharfs, on a scale of not less than one inch to a foot, the construction to be such, that the effect of the power may be varied accord-

ing to the weight to be raised, in a manner different from any now known or in use, yet more simple and effectual; the Gold Medal, or Twenty Guineas.

To be produced on or before the first Tuesday in February, 1788.

N. B. The model should neither be of the walking wheel nor capstan kind.

Horizontal Windmill.

Although it is well known that the effect of the wind on horizontal sails is greatly inferior to that on those which move in a vertical direction, yet, as there are some circumstances and situations where it would be most convenient to erect an horizontal mill, the Society do therefore offer the following Premium:

169. To the person who shall invent and produce to the Society, a model of an Horizontal Windmill on a scale of not less than one inch to a foot, superior to those already in use; the Gold Medal, or Twenty Guineas.

To be delivered to the Society, on or before the first Tuesday in February, 1788.

Hand Mill.

170. To the person who shall produce to the Society a better constructed Hand Mill for general purposes than any now known or in use; the Silver Medal, or Ten Guineas.

To be delivered to the Society on or before the last Tuesday in December, 1787.

Machine for Raising Coals, Ore, &c. &c.

171. To the person who shall invent a Machine for

raising Coals, Ore, &c. from mines which shall produce the effect at a less expense than those already known or in use; the Gold Medal, or Twenty Guineas.

A model of the machine, made on a scale of not less than one inch to a foot, to be produced to the Society on or before the second Tuesday in February, 1788.

Sluices for scouring Channels.

172. To the person who shall invent and produce to the Society, a model of a Sluice or Water-Gate, constructed in such a manner as to be with ease and expedition so disposed as to scour a Channel, increasing in width equal at least to an angle of forty-five degrees; Twenty Guineas.

To be produced on or before the second Tuesday in February, 1788.

Machine for clearing Rivers.

173. For the best model of a machine, superior to any now in use, for clearing Navigable Rivers from weeds, at the least expense; Ten Guineas.

To be produced to the Society on or before the first Tuesday in February, 1788.

Securing Buildings from Fire.

174. To the person who shall produce to the Society, an effectual method of preventing accidental Fires in houses or other buildings; Twenty Guineas.

To be produced on or before the second Tuesday in February, 1788.

PREMIUMS OFFERED FOR THE ADVANTAGE OF THE BRITISH COLONIES.

Nutmegs.

175. For the greatest quantity of merchantable Nutmegs, not less than five pounds weight, being the growth of his majesty's dominions in the West Indies, and equal to those imported from the islands of the East Indies; the Gold Medal, or one Hundred Pounds.

Satisfactory Certificates from the governor, lieutenant-governor, president of the council, or speaker of the house of assembly, of the place of growth, with an account of the number of trees, their age, nearly the quantity of fruit on each tree, and the manner of culture, to be produced on or before the first Tuesday in December, 1788.

176. The same premium is extended one year further.

Certificates to be produced on or before the second Tuesday in December, 1789.

N. B. Any person desirous of information on the subject of Nutmeg Trees, may obtain it from a memorial on the fructification of the Nutmeg, and the surest method of cultivating it to advantage, by the King's Gardener, at the Isle of Bourbon, inserted in Mr. Maty's Review, for August, 1783.

Bread-Fruit Tree.

177, 178. To the person or persons who, between

the first of June, and the fifteenth of August, 1787, shall bring into the port of London the greatest number of plants of one or both species of the Bread-Fruit Tree, in a growing state, not less than three of either species; the Gold Medal.

179, 180. The same premiums are extended one year further; the plants to be brought into the port of London, between the first of June, and the fifteenth of August, 1788.

N. B. The plants which obtain the Premiums are to be the property of the Society, to be disposed of according to their discretion.

Oil from Cotton seed.

The Society being informed that a considerable quantity of oil can be obtained from the seed of Cotton, and that, after the expression of the oil, the remaining cake will afford a strong and hearty food for cattle; and likewise, that the apparatus for the operation can be applied to the mill for sugar canes, and worked in the rainy season, at a moderate expence; have resolved, for the foregoing reasons, that the procuring oil from the seed of Cotton, is a proper object of a premium, considered as an encouragement for planters to extend the cultivation of Cotton, an article essentially requisite to increase the manufacture of that commodity in this country.

The Society therefore offer as follows:

181. To the planter, in any of the British Islands of the West Indies, who shall express oil from the seed of Cotton, and make from the remaining seed, hard and dry cakes, as food for cattle; the Gold Medal.

Certificates that not less than one ton of the oil has been expressed, and five hundred weight of the cakes obtained, to be produced to the Society, with two gallons of the oil, and two dozen of the cakes, together with a full account of the process, on or before the last Tuesday in November, 1787.

182. For the next greatest quantity, not less than half a ton of oil, and two hundred weight of the cakes; the Silver Medal.

183, 184. The same Premiums are extended one year further.

Certificates and samples to be produced on or before the last Tuesday in November, 1788.

Spirit from the Pulp of the Coffee Berry.

185. To the planter, in any of the British Islands in the West Indies, who shall distil the greatest quantity of Spirit from the Pulp of the Coffee Berry, not less than thirty gallons, and produce to the Society one gallon of the spirit, together with an account of the process used in the making it; the Gold Medal.

186. For the next greatest quantity, not less than fifteen gallons; the Silver Medal.

Certificates signed by the governor, lieutenant-governor, or some persons of known credit in the island, to be delivered to the Society, on or before the first Tuesday in January, 1788.

Senna.

187. To the person who shall import into the port of London, in the year 1787, the greatest quantity of Senna, not less than two hundred weight, the growth of any of the British Islands in the West Indies, and equal to the

Alexandrian Senna, now used for medicinal purposes ; the Gold Medal.

Certificates of the growth and method of culture, to be produced to the Society, on or before the first Tuesday in February, 1788.

188 The same Premium is extended one year further.

Certificates to be produced on or before the first Tuesday in February, 1789.

189. The same Premium is extended one year further.

Certificates to be produced on or before the first Tuesday in February, 1790.

Kali for Barilla.

190. To the person who shall cultivate in the Bahama Islands, or any other part of his Majesty's Dominions in the West Indies, in the year 1788, the greatest quantity of land, not less than five acres, with Spanish Kali, fit for the purpose of making Barilla ; the Gold Medal.

191. For the next greatest quantity not less than three acres ; the Silver Medal.

Certificates signed by the governor, lieutenant-governor, or other chief magistrate, of the quantity of land so cultivated, and of the state of the plants at the time of signing such Certificates, to be delivered to the Society on or before the second Tuesday in November, 1789.

192. The same Premium is extended one year further.

Certificates to be delivered on or before the second Tuesday in November, 1790.

Society's Office, Adelphi,
May 24, 1787.

Ordered ;—That the several Candidates and claimants to whom the Society shall adjudge Premiums or bounties, do attend at the Society's office in the Adelphi, on the

last Tuesday in May, 1788, at twelve o'clock at noon, to receive the same; that day being appointed by the Society for the distribution of their Rewards: and before that time, no Premium or bounty will be delivered, excepting to those who are out of the Kingdom, or prevented by unavoidable accidents.

In cases where personal attendance cannot be given, Deputies may be substituted to receive the Rewards.

GENERAL CONDITIONS.

NOTWITHSTANDING the Society reserve to themselves the power of giving, in all cases, such part only of any Premium as the performance shall be adjudged to deserve, or of withholding the whole, if there be no merit; yet the Candidates may be assured, the Society will always judge liberally of their several claims.

It is required, that the matters for which Premiums are offered, be delivered in without names or any intimation to whom they belong; that each particular thing be marked in what manner each claimant thinks fit, such claimant sending with it a paper sealed up, having on the outside a corresponding mark, and on the inside, the claimant's name and address.

No papers shall be opened, but such as shall gain Premiums, unless where it appears to the Society absolutely necessary for the determination of the claim; all the rest shall be returned unopened, with the matters to which they belong, if inquired after by their marks within two years; after which time, if not demanded, they shall publicly burnt, unopened, at some meeting of the Society.

All models of machines, which obtain Premiums or bounties, shall be the property of the Society.

All the Premiums of this Society are designed for that part of Great Britain called England, the dominion of Wales, and the town of Berwick upon Tweed, unless expressly mentioned to the contrary.

The claims shall be determined as soon as possible after the delivery of the specimens.

No person shall receive any premium, bounty or encouragement, from the Society, for any matter for which he has obtained, or proposes to obtain, a patent.

A candidate for a premium, or a person applying for a bounty, being detected in any disingenuous method to impose on the Society, shall forfeit such premium or bounty, and be deemed incapable of obtaining any for the future.

The performances which each year obtain Premiums or bounties, are to remain with the Society until the end of May, except as mentioned in the conditions annexed to the Premiums offered for promoting the Polite Arts.

No member of this Society shall be a candidate for, or entitled to receive any Premium, bounty, or reward whatsoever, except the honorary medal of the Society.

Where Certificates are required to be produced in claim of Premiums, they should be expressed as nearly as possible in the words of the respective advertisements, and should not be from the candidate (solely), but from some other person or persons, who have a positive knowledge of the facts certified.

Where Premiums or bounties are obtained, in consequence of specimens produced, the Society mean to retain such part of those specimens as they may judge necessary, making a reasonable allowance for the same.

No candidate shall be present at any meeting of the

Society or Committees, or admitted at the Society's rooms, after they have delivered in their claims, until such claims are adjudged, unless summoned by the Committee.

N. B. Any information or advice that may forward the designs of this Society for the public good, will be received thankfully, and duly considered, if communicated by letter, addressed to the Society, and directed to Mr. More, the Secretary, at the Society's office, in the Adelphi Buildings, London.

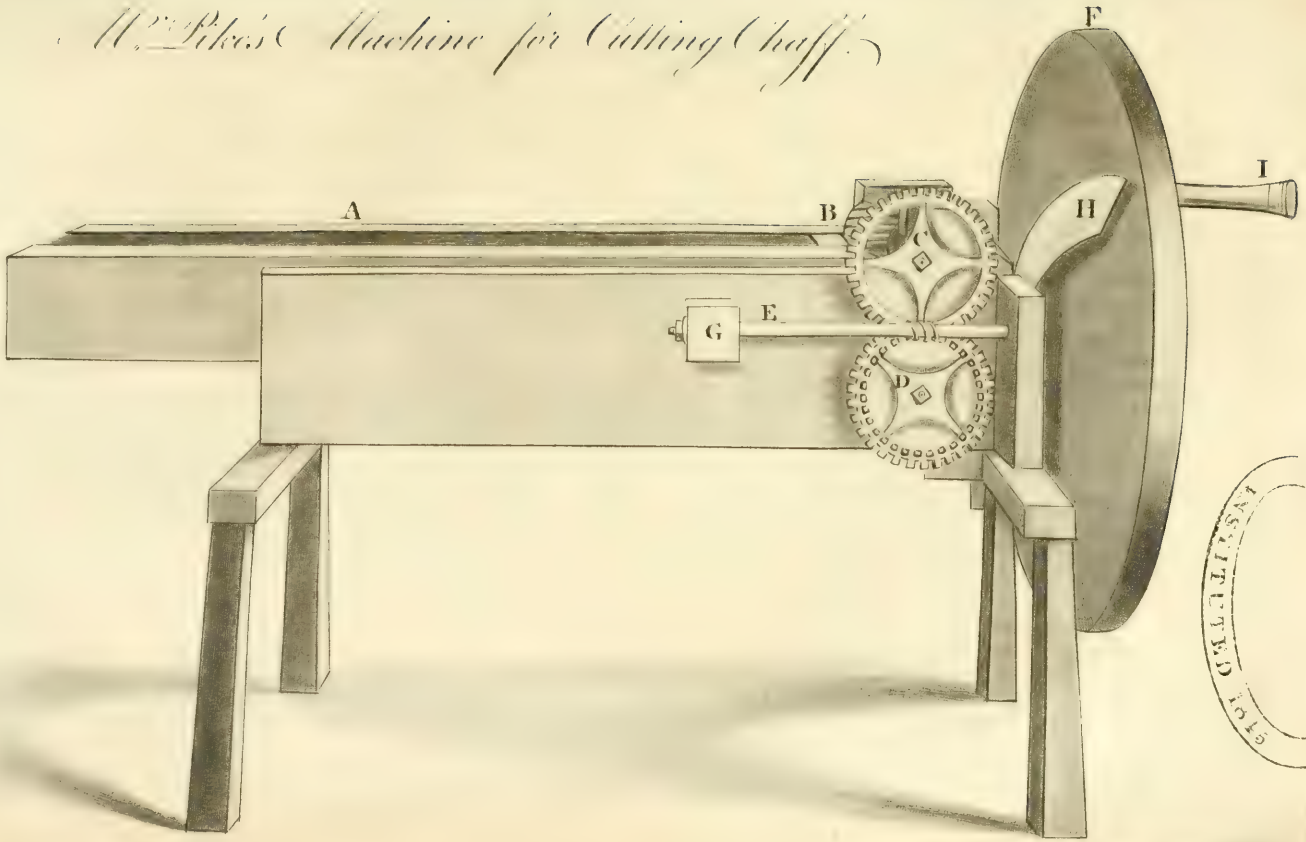
*** In case any person should be inclinable to leave a sum of money to this Society, by will, the following form is offered for that purpose:

Item.—I give and bequeath unto A. B. and C. D. the sum of upon condition and to the intent, that they, or one of them, do pay the same to the Collector, for the time being, of a Society in London, who now call themselves the Society for the Encouragement of Arts, Manufactures and Commerce; which said sum of I will, and desire may be paid out of my personal estate, and applied towards the carrying on the laudable designs of the Society.

By order of the Society,

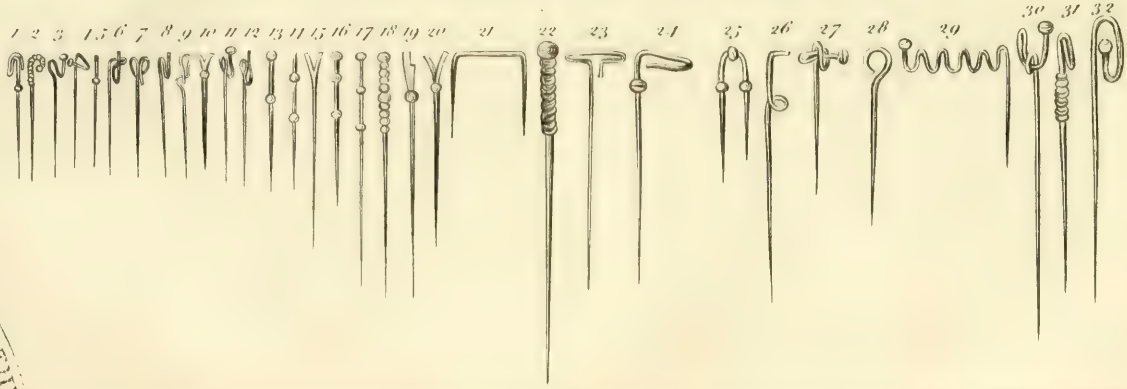
Samuel More, Secretary.

W.m Pike's Machine for Cutting Chaff.



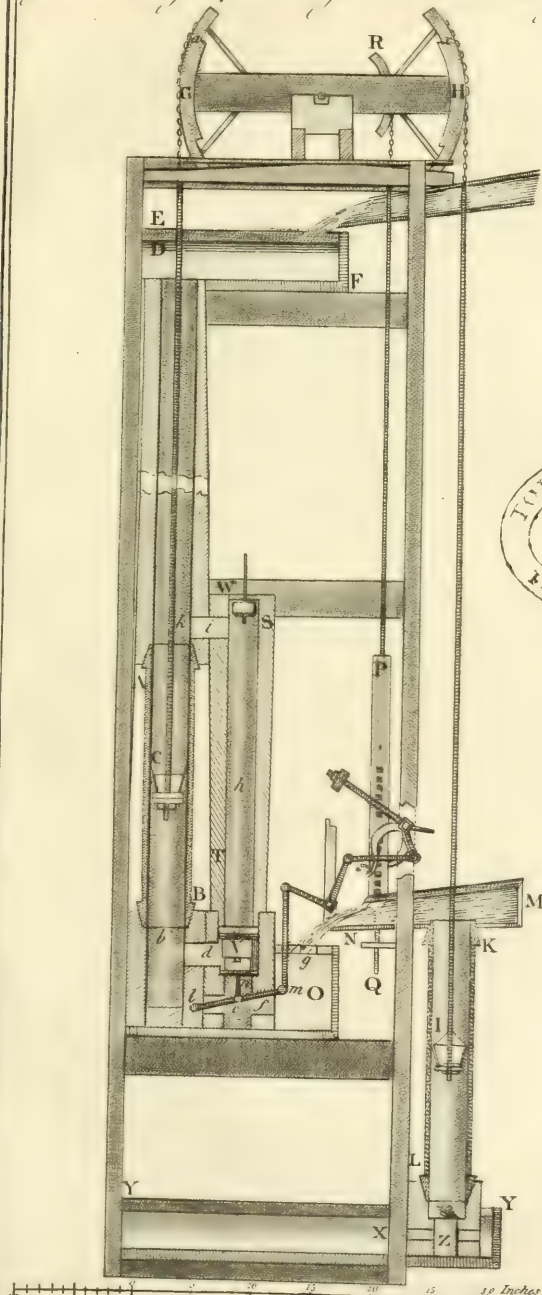
SOCIETY ATHENÆUM
OF ARTS, CRAFTS & SCIENCES

. W. Chase's. Machine for teaching Blind Persons. Musick.



TORONTO ATHENAEUM
INSTITUTED

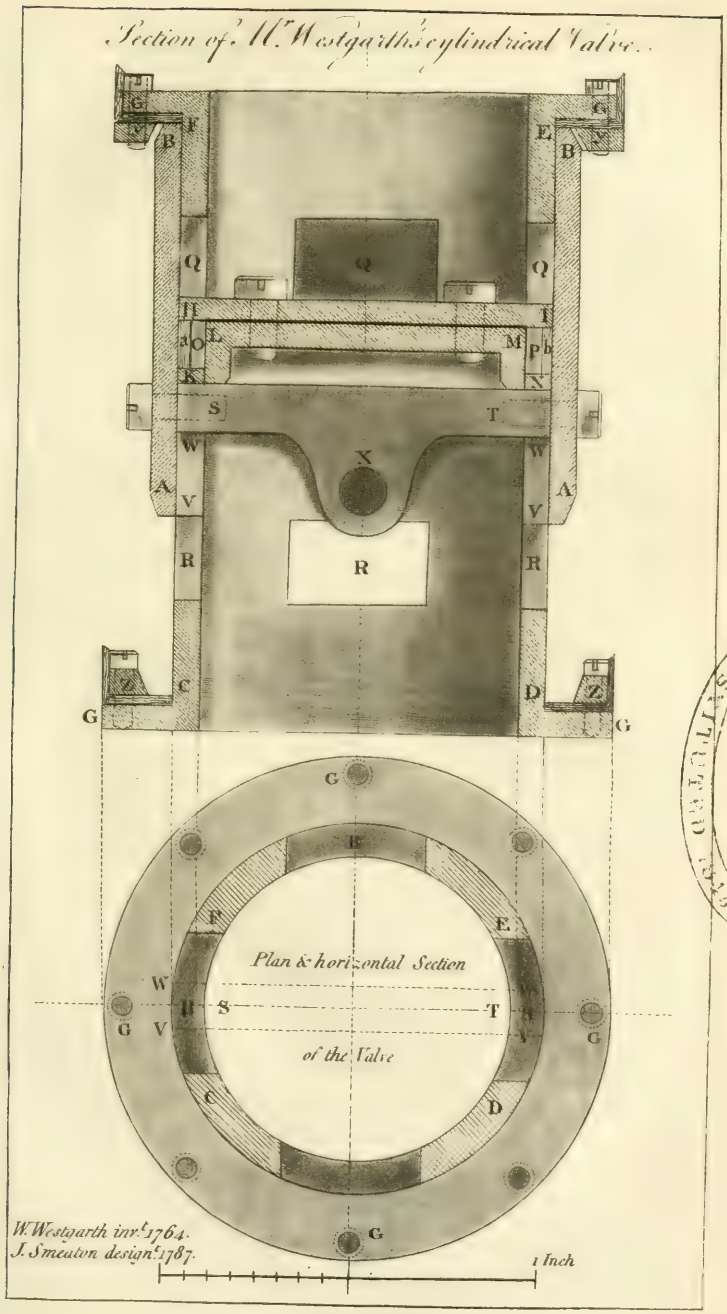
General Design of M.r Westgarth's Statical Engine.



TORONTO ATHE
INSTITUTED

Inches.

Contracted from M.r Westgarth's Original Design by J. Smeaton 1787.


Section of W. Westgarth's cylindrical Valve.
Plan & horizontal Section
of the Valve
W. Westgarth inv.t 1764.
J. Smeaton design.t 1787.
1 Inch

A

LIST

OF

CONTRIBUTING MEMBERS.

N. B. Those marked with **, pay Five Guineas annually; those marked with * Three Guineas annually; those with P are Perpetual Members; those with †† have served the Office of Steward; and those with † are Stewards Elect.

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Ailesbury, Thomas Earl of
Affleck, Admiral Sir Edmund, Bart. M.P.
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Adam, Robert, Esq. F.R. and A.S. *Ditto*
Adam, William, Esq. *Ditto*
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P Egremont, George Wyndham, Earl of
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Errington, George, Esq.
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Evans, Morgan, Esq. *Lincoln's-inn*
*† Ewer, Samuel, Esq. *Camberwell*

F.

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Finch, the Honourable Captain William, *Albury, near Guildford*
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Fordyce, George, M. D. F.R.S. *Essex-street, Strand*
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Frankland, William, Esq. *Gray's-inn*
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Freeman, Stephen, M.D. *Hatton-street*
Frend, Mr. George, *Abroad*
Fuller, William, Esq. *New-road, Southwark*

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Glenny, George, Esq. *Bromley-hill, Kent*
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Gosling, Robert, Esq. *Fleet-street*
Gosling, Francis, Esq. *Ditto*
Grant, Major John, *Portman-square*
††* Green Valentine, Esq. F.A S. *Newman-street*

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Green, Mr. Hezekiah, *Drury-lane*
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Greenwood, Abraham, Esq. *Steining-lane*
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Groves, John, Esq. *Milbank*
Grubb, John, Esq. *Lincoln's-inn-fields*
Gullet, Christopher, Esq. *Exeter*

H.

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Hawke, Martin, Lord
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Howard, John, Lord
Hasland, His Excellency Count
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Hawkins, Christopher, Esq. M.P.
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TRANSACTIONS

OF THE

SOCIETY,

INSTITUTED AT LONDON

FOR

ENCOURAGEMENT

OF

ARTS, MANUFACTURES, and COMMERCE;

WITH THE

PREMIUMS offered in the YEAR 1788.

VOL. VI.

LONDON:

PRINTED BY T. WILKINS, ALDERMANBURY.

TO BE HAD BY MEMBERS, OF THE REGISTER AT THE SOCIETY'S HOUSE IN THE ADELPHI; AND SOLD BY

Messrs. DODSLEY, HOOPER, ROBSON, LOCKYER DAVIS, WHITE, BECKETT, JOHNSON, CADELL, ELMSLEY, WALTER, RICHARDSON and DEBRETT.

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M,DCC,LXXXVIII.

PREFACE.

TO each of the foregoing Volumes of theſe Tranſactions, a Frontiſpiece has been prefixed, and as no one appears to this Book, ſome reaſon may be required why ſuch omiſſion has this year happened; it is therefore judged proper to inform the reader, that a Print, executed by Francis Bartolozzi, Eſq; R. A. of the Statue of Venus, which ornaments the Society's Room, and is the work of John Bacon, Eſq; R. A. was intended as a Frontiſpiece to this Volume, had not Mr Bartolozzi, from indiſpoſition and numerous avocations, been prevented finiſhing the Plate in due time for its inſertion this year; but as that celebrated Artiſt has promiſed to compleat the Engraving, for

the next Volume, it is hoped what is here ſaid will be received by the Publick, as a ſufficient apology for the want of a Frontiſpiece to this Book, which, however it may ſuffer in point of elegance from this unavoidable accident, will never heleſs be found to contain five Plates of conſiderable merit and utility.

On the peruſal of the ſeveral Papers which conſtitute this Volume, it muſt afford great ſatisfaction to every reader to obſerve the great progreſs now making in the different parts of the Kingdom, in the various branches of Agriculture, and the other uſeful Arts which are the more immediate objects of the Society's attention and encouragement.

Among thoſe Papers that relate to Agriculture, will be found a full account of ſome large Plantations made in Scotland,

land, by the Earl of Fife, and in England, by the Reverend Mr Lloyd, and Mr White, who has already been ſo frequently mentioned in the foregoing Volumes of theſe Tranſactions: Under this head alſo is inſerted an account of a conſiderable quantity of land gained from the Sea, on the coaſt of Eſſex, by the care and attention, and at the expenſe of the Reverend Henry Bate Dudley. The many places on the coaſt of Great Britain where good land is occaſionally overflowed by the Sea, and thus rendered uſeleſs, makes every attempt to recover and encloſe ſuch ground, highly deſerving the regard and attention of the Publick and the Society.

Here too will be found a Paper from Mr Profeſſor Roſs of Aberdeen, on the culture of the Turnep-rooted Cabbage; a Plant, through the medium of this So-

ciety, and by the ſedulous attention of that gentleman, now cultivating to advantage in the northern parts of this Iſland.

Under the article of Agriculture is alſo inſerted a full account of the Drill Huſbandry, tried on a ſcale hitherto unattempted, and with a degree of ſucceſs that fully juſtifies an opinion long embraced by many intelligent Perſons, that the Drill Huſbandry, at leaſt on ſoils adapted to it, has great advantage over the Broad-caſt method; and there is little doubt that in this age of experiment and obſervation, when Agriculture has ſo deſervedly become the object of ſerious attention among ſome of the firſt characters in the Kingdom, the experiments of Mr Boote, will induce ſuch trials to be made as may effectually decide that queſtion ſo long agitated by Agriculturiſts, on the general comparative advantages of the

the Drill and Broad-caſt Huſbandry in the culture of Grain.

The many and important uſes to which Alkaline Salts are applicable in Medicine, Bleaching, Glaſs-making, Soap-making, Dying, &c. will render the account of the diſcovery of a Native Foſſil Alkali, at Bombay, inſerted under the head of Chemiſtry, an object of conſiderable importance to many Manufacturers in theſe Kingdoms; for although the preſent price of Barilla is ſuch, as renders the importation of this kind of Foſſil Alkali, of leſs conſequence than might be expected; yet in time of war, when the price of that neceſſary article riſes very high, it may become convenient to import this material from the Eaſt Indies, for the ſupply of thoſe works which it is impoſſible to carry on without a Salt of this nature; and the account of the experi-

ments on this ſubſtance, made by that learned and accurate Chemiſt, Mr Kier, will render the Paper inſerted in this Volume, equally ſatisfactory to the Philoſopher and Manufacturer.

Under the claſs of Polite Arts, will be found a Letter on the Survey of the County of Lancaſter; and it is but juſtice to Mr Yates, to ſay, that from a moſt exact and attentive enquiry, it appeared his Map was fully deſerving the honour the Society conferred upon him.

In MANUFACTURES, the reader will find an account of making Paper from Raw Vegetable Subſtances, which, if it has ever been practiſed abroad, does not appear to have been yet brought forward on a ſcale of buſineſs in theſe Kingdoms, but from the ſucceſs that has attended theſe firſt experiments, promiſes to become

come a matter of ſome importance. Under this head, is alſo inſerted ſome Letters from a well known Artiſt, and a Copper-plate Printer, on the quality of that Paper, for which the Gold Medal was adjudged to Mr Bates of Wickham Marſh, in Buckinghamſhire; and which, on trial, appears equally fit as that imported, for taking Impreſſions from Engraved Copper-plates.

As from the Letters of Miſs Rhodes and others, inſerted in the former Volumes of theſe Tranſactions, it ſeems probable, that the breeding Silk Worms, and the culture of Silk, may one day become an object of great conſequence to theſe Kingdoms. The reader will be pleaſed to find under the head of Manufactures, a Letter inſerted from a gentleman whoſe abilities in that line, are univerſally and deſervedly acknowledged.

Under

Under the article of MECHANICKS, may be ſeen a Plate and Deſcription of an Inſtrument for meaſuring Angles, which it is preſumed will anſwer the purpoſe it is contrived for, more commodiouſly and more accurately, than thoſe hitherto uſed. A deſcription and two Plates of a Machine for ſetting Wheels and Pinions in Watch work, with more truth and accuracy than by thoſe in common uſe, are alſo here given, and it is believed will anſwer ſome very good purpoſes, to the ingenious Artiſts employed in the buſineſs of Watch and Clock-making.

The inconveniencies that frequently attend the removal of large Maſſes of Stone or Bodies of Trees, over ſoft or moraſſy Ground, occaſioned the Society to offer a Premium for the beſt contrived Carriage to obviate thoſe difficulties; and this

this year, one has been produced, that promiſes effectually to anſwer the end propoſed: Of this Carriage, and the neceſſary apparatus, two Plates and a full Deſcription, are given in this Volume, and a Model is reſerved in the Society's Repoſitory.

As a compleat Machine for this purpoſe, is much wiſhed for, if hereafter any perſon ſhould improve on the preſent conſtruction, an account of ſuch improvements will be highly acceptable to the Society.

The very conſiderable acceſſion of Members, which the Society has of late happily experienced, has enabled them to offer ſeveral new Premiums; ſome of which it may not be improper to enumerate.

In

In Agriculture.

The Silver Fir, having been ſaid to produce a very good kind of Wood, ſuperior to moſt others of the Fir tribe, a Premium has been offered, or rather revived, for promoting the growth of that tree.

The culture of the Turnep-rooted Cabbage being become an object of conſiderable attention, and many Farmers imagining that the tranſplanting them is attended with more expenſe than it really is, have been debarred propagating that uſeful Plant, ſome gentlemen have been led to cultivate it by ſowing the ſeed broad-caſt, and hoeing the intervals, and are ſaid to have ſucceeded in this manner: It has therefore been judged proper to offer a Premium for aſcertaining the comparative advantage of the culture of the Turnep-rooted Cabbage, by ſowing

ſowing it broad-caſt and hoeing out the Plants, as practiſed with the common Turnep, or by ſowing the ſeed in Nurſeries, and tranſplanting the Plants, hoeing the intervals.—It is probable, that by offering this Premium, the Society will obtain ſatisfactory accounts on this ſubject, which cannot fail of being very advantageous to the Publick.

The cure of that diſeaſe in Potatoes, called the CURLED POTATOE, has alſo become an object of the Society's conſideration, and a Premium is now offered for a method of preventing that diſorder.

As in the Drill-huſbandry, hoeing the land is univerſally acknowledged to be of the firſt importance, an improvement in the Horſe or Hand Hoe, has been judged worthy attention.

In Chemistry.

The many and fatal diſorders that afflict the workmen, employed in the making and uſing White Lead, are too well known, and the Society have judged the making White Lead, or the diſcovering a ſubſtitute for it, which ſhall be free from all its noxious qualities, fit ſubjects of their attention, and have therefore thought proper to offer two Premiums, the one for improving the White Lead, the other, for diſcovering a proper ſubſtitute: It is obvious great advantages would ariſe, ſhould the offering theſe Premiums be attended with the wiſhed for ſucceſs.

In Polite Arts.

An honorary mark of the Society's attention, is offered to the Perſon who ſhall produce

produce the beſt Copy of a Portrait of the late Mr Stock of Hampſtead, who by Will bequeathed a ſum of money to be annually offered by them, for promoting the Arts of Painting, Sculpture and Architecture.

As a knowledge of the Natural Productions of the ſeveral parts of the Kingdom, muſt tend, in an eminent degree, to the perfecting thoſe Manufactures already eſtabliſhed, and to the introducing others not hitherto practiſed in theſe Kingdoms, the Society, have now offered the moſt diſtinguiſhing mark of their approbation, to the author who ſhall publiſh the Natural Hiſtory of any of the Counties of England or Wales, at the ſame time guarding the conditions of the Premium in ſuch manner, that the Work may have a clear tendency to the promoting the Arts and Manufactures of the Kingdom at large.

In Mechanicks.

In this Maritime Country, all things relating to the ſafety of the Navy, merit the moſt attentive conſideration, and the importance of connecting and ſecuring the parts of Ships, by well driving the Bolts, eſpecially ſince the uſe of Copper is become ſo general, is well known, a Premium is therefore offered for diſcovering a method ſuperior to any in practice, for performing this neceſſary work.

The enormous price to which Hemp has lately riſen, and the conſideration that the far greater part made uſe of, is of foreign growth, has induced the Society to offer a conſiderable Reward for the introducing Metal in the room of Hemp, for many purpoſes wherein that material has hitherto been employed; a conſiderable Premium is therefore this year offered

fered, for a Metal Rope or Chain, that ſhall fully anſwer the purpoſe of a ſtrong Hempen Rope. The dampneſs of deep Mines, and the heat of large Foundries, in both which places very great weights are conſtantly lifted, render the expenſe of Hempen Ropes very burthenſome; as in the firſt inſtance, ſuch Ropes being ſoon rotted by the wet; and in the other, the texture deſtroyed by the heat they are expoſed to, the Limbs and Lives of the Workmen are conſtantly ſubjected to imminent danger, which it is hoped the uſe of Metal may effectually guard againſt.

The advantages that would ariſe from the obtaining a better Machine for raiſing Water, and a more convenient method of extinguiſhing Fires, than any now known or practiſed, are obvious;

and the Society have this year offered rewards for ſuch diſcoveries.

In Colonies and Trade.

The obtaining, for the Weſt India Iſlands, that excellent plant, the Bread Fruit Tree, has long been conſidered as a ſubject of the firſt importance to thoſe Iſlands, and Premiums have been offered, hitherto without ſucceſs, for bringing ſome of the trees to England, in order to their being forwarded to the Weſt Indies; but as it now ſeems probable that ſome of the Veſſels lately ſent to the South Seas, will convey thoſe Plants immediately to his Majeſty's Settlements in the Weſt Indies, the Society, to co-operate in ſo deſirable a meaſure, and reward as much as in them lies, ſo laudable an attempt, have this year changed the conditions of their Premium, and offered it for

for the immediate conveyance of the Plants from the South Sea to the Iſlands of the Atlantic Ocean.

The great uſes of the Gum Senegal, in Calicoe Printing, and the high price that Gum is frequently ſold at, renders any Succedaneum a valuable acquiſition; and as from ſome trials the Gum of the Caſhew-tree, which grows luxuriantly in Jamaica, and the other Weſt India Iſlands, has been found to anſwer the purpoſe of the Gum Senegal, a Premium has been offered, this year, for importing ſuch a quantity as may eſtabliſh its character among the Manufacturers, and aſſure a profit to the Grower, on his ſending it to this Country.

It may not be here improper to congratulate the Publick, on the full eſtabliſhment of a Manufacture, in this

Country, which it may without vanity be ſaid, has riſen to its preſent height, under the auſpices of the Society. The Manu acture now alluded to is that of Paper for taking Impreſſions from Engraved or Mezzotinto Plates. And as all the Prints in this Volume, are on Paper made by Mr Bates of Wickham Marſh, Bucks, to whom the gold medal was laſt year adjudged, it is plain that Impreſſions of even the ſofteſt and moſt delicate work in Mezzotinto, may be taken on Engliſh, equally as well, as on the beſt Paper imported from abroad for that purpoſe.

All uſeful and deſerving communications, that may tend to promote the views of the Society, will make part of the future Volumes of theſe Tranſactions: And the Authors of ſuch Papers as are calculated to forward the improvement of the

the Arts, Manufactures and Commerce of theſe Kingdoms, will, it is preſumed, here find the moſt proper channel, by which to convey to futurity, their thoughts on ſuch important objects, with credit to themſelves and advantage to their Country.

Directions to the BOOKBINDER.

Place the Plate of Mr Matthew Hill's Machine for meaſuring Angles to face page 183.

The Plate of Mr Ridley's Sector depthning Tool to face page 188.

The Plate of Mr Ridley's improved Sector to face page 196.

The Plate of Mr Beſant's explanation of his Carriage to face page 203.

The Plate of Mr Beſant's Carriage to face page 209.

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ERRATA.

Page 59. line 6. for *Vegi-* read *Vege-*

61. 2. and page 63 line 10 for *embarkment* read *embankment*

73. laſt but one, after *attending*, inſert *it*

139. 8. for *ſugar lead*, read *ſugar of lead*

331. 1. for *aavantage*, read *advantage*

PAPERS

IN

AGRICULTURE.

AGRICULTURE.

IT muſt be highly ſatisfactory to every lover of his country, to obſerve the various improvements, daily ariſing in that uſeful branch of Agriculture, the cultivating the growth of Timber in theſe iſlands; and the Society contemplate with great pleaſure, the accounts they receive of large plantations making among the more uncultivated parts of the kingdom; whereby, not only the beauty of the land is highly encreaſed, and the induſtrious labourer employed: but a foundation laid for future population in thoſe parts, where the want of wood for the neceſſary purpoſes of building and fewel, have rendered it impoſſible for men to eſtabliſh themſelves in large bodies, and conſequently

an appearance of want and deſolation, has ſpread itſelf over the country; this to a humane mind would ſeem a ſufficient inducement to the planting the waſtes and hitherto unimproved moors, over the whole iſland; but when it is conſidered what pecuniary advantages will, in time, ariſe to the proprietors of ſuch lands, it is ſurpriſing ſo many acres are to be found in this kingdom in the ſtate they now appear.

It will be evident from the following papers, that the Earl of Fife, has ſet a laudable example to his neighbours in this inſtance, and the Society, fully ſenſible of the advantages of ſuch improvements, returned their thanks to his Lordſhip for the communication, and preſented their Gold medal to him, as a mark of their approbation of his Lordſhip's ſpirited and well directed exertions in ſo extenſive an undertaking.

Duff-

Duff Houſe, Dec. 9, 1787.

SIR,

I Have ſent under another cover, a letter containing a ſtate of my plantations, which you will be ſo good as preſent to the Society. I have only to add, that moſt of my plantations in the counties of Aberdeen, and Banff, and ſome in Moray, are incloſed with ſtone fences, of a proper height coped with two turfs; there are no ſtones in moſt of the moors in the county of Moray, many of the turf fences, are above twenty years old, and as good as when they were built, I am with great reſpect,

Sir,

Your moſt obedient,

humble Servant,

Mr. MORE.

FIFE.

Duff Houſe, Dec. 9, 1787.

SIR,

I Am induced to trouble you with the following account of my plantations, in this diſtant part of the kingdom, from an hope that it may lead others to purſue the ſame meaſures which I have adopted; in order to cover waſte lands, and barren moors, and to render them, however incapable they may appear of cultivation, at once conducive to utility and beauty. There has been for ſome years, a great deſire in this country, for promoting Agriculture, and Manufactories; the great drawback is the expence of fire, and want of timber. Coals are brought by ſea at great expence of freight, and what is ſtill more grievous, a heavy and unjuſt tax on it; for thoſe who are at the greateſt diſtance from the coal pit, pay a higher tax than

than thoſe that are nearer to it; in many places there is no peat or turf, and that wretched fire, coſts more expenſe in loſs of time than it is worth.

My great inducement to promote extenſive plantations, was to aid Agriculture and Manufactories, and to ornament and beautify the country.

It is now above thirty years ſince my plantations commenced, and from their infancy to the preſent period, I have nurſed them with care, regularity, and perſeverance; every ſucceeding year has enlarged the old, or has given birth to a new planted encloſure; by theſe means, about ſeven thouſand acres of bleak and inhoſpitable moors, have been cloathed with riſing and flouriſhing trees, in Aberdeenſhire, Banffſhire, and in Moray.

My experience, I ſhould hope, has in ſome degree kept pace with the extenſion of my plantations, every publication on the ſubject naturally attracted my attention; but my knowledge has been principally founded on my obſervations of the different ſoils, and of the various ſituations in which I have tried experiments with almoſt every ſpecies of foreſt trees; ſhould my wiſhes of communicating information, or of inſpiring emulation be anſwered, I ſhall moſt willingly embrace every opportunity of laying before the Society a full and accurate account of my proceedings.

I began firſt at this place to incloſe my Park, it is in the county of Banff, there were many natural beauties from ſea-views, a fine river, much variety from inequality of ground, and fine rock ſcenes in different parts of the river: there was not

not a tree when I began, and it was generally believed no wood would thrive ſo near the ſea coaſt; I have proved that to be a miſtake, my Park is about fourteen miles round. I have every kind of foreſt trees, from thirty years old, in a moſt thriving ſtate, and few places better wooded: this is an encouragement to thoſe who love planting, where the climate is more favourable.

I ſhall not trouble the Society with any account of what I have done for the ornament and decoration of my grounds, as that, although it employs many poor labourers, may be conſidered as foppiſh dreſs, and changeable like other faſhionable cloathing, but ſhall proceed to lay before them, a narrative of the methods which I have adopted in planting barren moors, and lands waſte and uncultivated.

I encloſe the Moor, by an earth dyke of turf five feet high, four feet wide at the foundation, and twenty two inches at top, at four ſhillings for every Scotch chain of twenty four ells.

I plant in every acre about twelve hundred trees; I uſed to plant above three thouſand, but by experience, I find it better not to plant them ſo thick, but make them up if neceſſary the third year, eſpecially in my Plantations in the county of Moray, where ſcarcely a tree planted ever fails; the greateſt number are Scotch Firs, they are tranſplanted from the ſeed beds the third year: I purchaſe them at tenpence the thouſand, I only conſider them as nurſes to my other trees, for they are regularly cut out, when they have done their duty as nurſes, and they are profitable for fire and uſeful in agriculture. I plant every other ſpecies of foreſt

foreſt trees intermixed with the firs. I order different pieces of the Moor to be trenched where the ſoil is beſt and moſt ſheltered, and lay a little lime and ſome dung on it: in thoſe places, I ſow ſeeds of trees for nurſery.

I alſo plant, in beds, year old different trees taken from my other Nurſeries; I nurſe them for three years, and then plant them all over my Plantations: this I find very beneficial, as they are raiſed in the ſame ſoil.

When I am filling up the Plantation, the firs are then for the firſt time cut down, or they are tranſplanted, being raiſed with balls of earth, when the Moor is wet with rain, which is very eaſily done, and they are carried to incloſures of ten or twelve acres, and where from a deſire to forward woods, I am planting trees more advanced;

advanced: they are planted in pits about forty feet diſtance, and ſeldom or ever fail, and anſwer a ſecond time as nurſes.

In different parts of my eſtate, I have alſo planted belts by the ſide of the high roads, about twenty feet in width, and ſmall plantations of two or three acres; theſe are extended round different farms, and are filled with Aſh, Oak, Elm, Beech, Sycamore, and other foreſt trees, about fifteen feet high; in theſe ſpots, which are trenched, and regularly hoed twice a year, they remain three years, then the half, or two thirds of them, where they ſtand two cloſely, are removed to open places, cut in the Fir plantations, where they are planted at proper diſtances, about thirty or forty feet, and are ſheltered from the wind: this ſcheme has very rarely failed; and I have obſerved with great

pleaſure

pleaſure and ſatisfaction, that by the regularity of my methods, by my unabated zeal, and unremitted care, ſome of my plantations appear to have made a more rapid progreſs, in ten years, than thoſe in other ſituations have in twenty.

My firſt care, after the incloſure is properly filled up, is to guard againſt any injury from cattle; a ſmall allowance given to a few labourers anſwers that purpoſe, if the fences are properly executed, they require very little repair; after the plantation is filled up, the moſt regular and neceſſary attention muſt be had to the weeding of it, and this is carried on over my plantations, of all ages, in the moſt exact manner.

I make roads through all the plantations, which are carried forward according to the ſituation, never in a ſtraight line, ſo as

as to draw violent winds; and thoſe roads go to all the parts of the plantations, they make agreeable rides through fine woods, formerly a bleak moor, and anſwer not only for filling them up, but alſo for carrying away the neceſſary weedings; the value and proſperity of the woods, depending as I obſerved before, on the unremitted attention in weeding it.

I begin to plant in October, and continue till April; if the weather is froſty and not fit for planting, all the people are employed in weeding the woods.

My great plantations for the laſt eighteen years has been near Innes-houſe, in the county of Moray, and for your more particular information, I convey to you along with this, an account of my plantations there, ſince the firſt of February 1784, and continued down to the laſt of March,

March, 1787, atteſted, and ſigned by my planter.

I am too well convinced, of the anxious and zealous diſpoſition of the Society, to promote and liſten to improvements in planting, and Agriculture, to imagine that any apology is neceſſary for the length of this letter; nor have I been deterred from writing, by the diſtance of this place from the capital, as I am ſenſible how much it is their wiſh, that the advancement of the Arts, ſhould be diſſemminated through every part of the kingdom.

I am with great reſpect, Sir,

Your moſt obedient

humble Servant,

Mr. More.

Fife.

Plantations

Plantations of the EARL of FIFE, about Innes, &c. in the County of Moray, planted ſince the firſt of February 1784, and continued down to the laſt of March, 1787. The names of which are as follows; with the number of acres contained in each plantation, and the ells of dykes.

	Acres.	Ells of Dyke
Bin Hill of Spey	520	6114
King's Road ſide	5	718
North the Glebe	5½	644
Moſs towie	14	1944
Bridge of Darkland	5	586
	549½	10006

The above five hundred and forty nine and a half acres, are planted with the following trees, at about one thouſand two hundred and thirty to the Acre, and are as follows

Sycamore

Sycamore	8000
Common Firs	266600
Oaks	65160
Beech	64306
Larch	50000
Birch	100000
Poplar	10000
Alder	12000
Willows	8000
Mountain Aſh	29500
Laburnum	6000
Elms	12000
Aſh	12000
Hazle	6000
Spruce Fir	5000
Sweet Cheſnuts	22000
	676566

The above Plantations, are well ſecured from cattle, and the trees in a moſt thriving ſtate at preſent.

Beſides the above incloſures, there are on the Farm of Darkland, one thouſand ſeven hundred and eighteen ells, of a hedge and belt; and on the Farm of Forreſterſeat, one thouſand five hundred and two ells; likewiſe from the mains of Innes, to the church of Urquhart, one thouſand five hundred and twenty-ſix ells: The above hedges and trees all kept clean and in a very thriving ſtate at preſent.

JAMES GEORGE.

There are beſides what is ſtated above, about ſixty thouſand Firs, and one hundred thouſand Oaks, Birch, Aſh, Larch, and other Foreſt trees, planted ſince February, 1784, in the Plantations in the Counties of Aberdeen, and Banff, all in a thriving ſtate.

Innes Houſe,
December 7, 1787.

The

The Society after having voted their Gold Medal to the Earl of Fife, requeſted his Lordſhip to favour them with an account of the preſent ſtate and condition of all his Plantations made more than fifteen years ago; ſpecifying the nature of the ſoil, what ſpecies of timber thrives beſt, the ſizes of the different kinds of trees, and what uſes have been made of thoſe trees already cut out; but particularly whether the ſaid Plantations are intended ſolely for the purpoſe of raiſing timber, or as is the general practice in England, for raiſing timber and underwood.

In conſequence of the foregoing requeſt, his Lordſhip obliged the Society with the following Letter and particulars of his ſeveral Plantations.

Whitehall, Feb. 9, 1788.

SIR,

I Wiſhed to have returned an anſwer ſooner to the Society, but I have been prevented by the length of time neceſſary for ſending to the country: I have now procured the dimenſions of the different trees in my Plantations, which were made above fifteen years ago, with as particular an account of the nature of the ſoil as can be given, which over ſo very large an extent of ground, muſt of courſe be very different.

The report is incloſed, if it ſhould appear tedious, I hope to be excuſed, as it proceeds from a deſire to give the moſt particular information.—It is my cuſtom every year to review the fences, and ride or walk over every part of the Plantations.

And

And ſo anxious am I to raiſe timber, that I have myſelf written in the rentual books of the different eſtates, a memorial, requeſting my ſucceſſors to attend to keeping the fences in repair, and never to allow cattle at any time to get into the woods, as upon their conſtant attention to this particular, will depend the value of the trees.

As my great deſire is to raiſe the woods for the purpoſe of timber, I never cut a tree when it can be tranſplanted into any other Plantation; the trees therefore that are cut, are alway the worſt, and are removed in order to give room for a more valuable neighbour to proſper Hence I cannot expect the profit from the weedings to be very conſiderable; there muſt however, from ſuch extenſive Plantations, be a great many trees cut down. I do as much as poſſible direct theſe re-

movals myſelf, or when that cannot be done, I truſt it to thoſe who have planted the trees, who know fully my wiſhes, and who, if they merit any cenſure, are rather too ſparing of the axe. A diſtinct book is regularly kept for every ſeparate Plantation; the weedings are ſold by auction at thoſe periods which are known to be moſt convenient for the country people: theſe cautions prevent cheating, and ſhews the exact profit which every year produces. I think the weedings were ſold laſt year for about one hundred and fifty pounds; and every year, in all human probability, the advantage muſt increaſe. The firs anſwer for farm-houſes, and paling for fences, the aſh, oak, elm, beech, &c. anſwer for the different uſes in huſbandry, ſuch as carts, ploughs, harrows, and barrows.

The underwood is raiſed for cover and for beauty, beſides which, it alſo anſwers for

for firing; I wiſh it however to be underſtood, that the underwood never is allowed to interfere with the grand and leading object the raiſing of timber. The Society alſo will pleaſe to obſerve, that all the trees, except the Firs, are planted at ſuch diſtances, as never to require tranſplantation, and if any of them fail, new trees immediately ſupply the vacancies.

The Firs therefore are the only trees, which are allowed to be cut down in the great Plantations, which have been raiſed during this laſt twenty years.

I have the honour to be with the greateſt reſpect, Sir,

Your moſt obedient
humble ſervant,

FIFE.

SAM. MORE, Eſq.

REPORT

with reſpect to the Size &c. of the

TIMBER

IN THE

PLANTATIONS,

NEAR

DUFF HOUSE,

BELONGING TO THE

EARL of FIFE.

I Have meaſured ſome of the Foreſt Trees in different parts of the plantations planted about twenty-five years ago, the circumference taken at three feet from the root, and they are as follows,

Loam

		Length of the Trunk Feet	Height Feet	Circumference Feet Inches
Loam and clay bottom	Oaks	12	25 to 30	2 9½
Light black earth	Elm	18	30 35	5 4
Heavy wet ground	Aſh	20	35 40	3 9
Dry ſandy ſoil	Beech	14	30 35	3 0
Good heavy Loom	Larch		46	6 3
	Silver Fir		44½	6 8

Oak ſells here from two to three ſhillings per ſolid foot; Aſh, and Elm, from one ſhilling and eightpence, to two ſhillings; Beech from one ſhilling to eighteenpence, and fullgrown Fir, from eight to tenpence: but in Lord Fife's Plantations, the worſt trees are only thined out for the benefit of what is left, and theſe are ſold by the piece; the Aſh and Elm, for labouring untenſils, from ten to twenty ſhillings, and the Firs, for roofs and rails, from three to ten ſhillings, the branches and ſmall weedings are uſed for fire wood.

The Plantations in this neighbourhood, are now all thined for this ſeaſon, and in general in a moſt thriving ſtate.

Underwood is only promoted with a view to the thriving of the Timber, which is Lord Fife's principal object.

JOHN GEDDES, Planter.

Duff Houſe,
Jan. 25, 1788.

N. B.

N. B. There are large Plantations at Duff Houſe, that for many years were kept trenched, in which are very few Firs, the weedings now become valuable.

FIFE.

PLAN-

PLANTATIONS of the EARL of FIFE, about INNES, &c. in the County of MORAY, the names of which are as follow, with the dates of their being planted, the number of Acres, in each Plantation, and Ells of Dykes.

		Acres	Ells of Dyke
1769.	Braiks Hill	10	960
	Horn Head and Thorney Crook	6	740
1770.	Clumps in the Greens	9	908
1771.	Belts in do.	2	480
	Cloggans	8	856
	Tile Hill Shirriff town	4½	575
	Little Ruther	6	946
	Loch Hill	36	2032
1772.	Burn side of Whinny-hall	3	720
	Black Hillock	3	540
	Carried over	87½	8757

Tide

		Acres	Ells of Dyke
Brought over		87½	8757
1772.	Tide Hill Barn yard	4	608
	Lochnabo	439	5640
	Rutherhill	18	1128
1773.	Elgins Hill	15¼	1030
	Belt at Barnyards	2¼	2270
	Belts at Elgin road ſide	1½	1520
	March Avenue	3	632
1774.	Belts in the Greens	2	720
	Crooked Wood	32	1445
		604¼	23750

The above ſix hundred and four acres and a half, are planted with the following trees, at about three thouſand to the acre; the different trees meaſured, were planted in the years 1769 and 1770.

Common

	Number of Trees	Inches of Girth	Feet High
Common Firs	1660000	27	31
Larch	28500	58	30
Oak	28500	23	21
Birch	28500	29	22
Mountain Aſh	28000	33	24
Alder	8000	29	26
Elm	4000	38	27
Aſh	5000	34	27
Willows	2000	40	26
Sycamore	2000	28	23
Hazle	3000		
Sweet Cheſnut	5000	29	18
Labernum	5000		
Silver Fir	4000	28	27
Beech	25000	25	20
	1836500		

All the above Plantations are in a moſt thriving ſtate at preſent, and well fenced

fenced from cattle, and the weedings and underwood, only promoted with a view to forward, and not to injure the thriving timber, which is Lord Fife's principal object, and there is no tree cut for profit, but only for the benefit and relief of thoſe left, and the worſt always cut.

When the above Plantations were planted, it was the practice to plant thick, but they have been regularly weeded ſo as the branches never touch one another; there are never any weeded or cut out but Firs, the firſt weedings of which were not good for any thing but firewood; but what are now cut or weeded ſerve for many purpoſes in the country, and ſell at twopence ſterling each, and their girths and heights are as in the foregoing tables, two feet above ground.

The ſoil in general is a light yellow mixture, and when it comes to any depth, it has a loamy bottom; ſeldom or ever any of the above trees fail.

JAMES GEORGE.

PLANTA-

PLANTATIONS of the EARL of FIFE, about INNES HOUSE, in the County of MORAY, planted in the following Years, with their names, number of Acres, and Ells of Dyke, &c. extracted from the planting Book.

		Acres	Ells of Dyke
1775.	Folds	5	625
	Moſs ſide of Meft	3½	500
	Finfan	21	1224
1776.	Corſkie Moor	16½	1058
	Parks of Loch Hill Belt and Hedge		2002
	Hedges of Barnyards		2000
1777.	Hedge at Moſstodlich		1262
	Belts at the Milburn	3	1892
	Fernfield	11	900
	Morriſton	6	555
	Belt at Slentack	½	510
	Carried over	66½	12528

		Acres.	Ells of Dyke
Brought over		66½	12528
	Belt at Shearſton	4	1132
	Belt at Andrew Downies		168
1778.	Loan Hilloch	¾	198
	Muiryhall	4¼	552
	Saughen Avenue	1	803
	Back Belt in the Greens	1½	678
		78	16059

The above ſeventy-eight acres are planted with the following trees, at three thouſand to the acre.

Common Firs	295000
Larch	5000
Oak	5000
Birch	5000
Carried over	310000

Brought

Brought over	310000
Mountain Aſh	5000
Beech	5000
Alder	1500
Elm	2000
Aſh	2000
Willows	2000
Sycamore	2000
Hazle	2000
Sweet Cheſnut	2000
Laburnum	2000
	335500

The above Plantations are regularly thined and well fenced from cattle, and are in a moſt thriving ſtate at preſent.

Planted in the followiug years.

	Acres	Ells of Dyke
1779. Eaſt Moors of Urquhart	670	5231
1780. Weſt ſide of the crooked Wood	36	1196
Galſlodge	1½	302
1781. South Moors of Urquhart	680	4970
1782. Quarrie Wood	350	3350
Little oak Wood and Sherrif Miln	22	1860
1783. Sanchrie and North the Glebe	22	1932
	1781½	18841

The above one thouſand ſeven hundred and eighty one acres and a half, are planted with the following trees, at one thouſand two hundred and thirty to the acre.

Common

Common Firs	1476820
Larch	98313
Oak	98313
Birch	98313
Mountain Aſh	98313
Beech	98313
Alder	10000
Elm	37600
Aſh	38500
Willows	3000
Sycamore	38000
Hazle	36200
Sweet Cheſnut	35100
Laburnum	38100
Spruce Fir	5000
Silver Fir	6500
	2216385

All the above Plantations are well ſecured from cattle, and are in a very thriving ſtate at preſent.

JAMES GEORGE.

The Reverend J. R. Lloyd, of Aſton, near Oſweſtry, Salop, having requeſted a copy of the premiums offered for planting Oaks, and the ſame being accordingly ſent to him, the following Letter and Certificate were received by the Society; and the Gold Medal adjudged to Mr. Lloyd, for having cauſed the Plantation to be made; after which the Letter dated December 19, 1787, was ſent by him, giving ſome further account of the methods purſued in forming the ſaid Plantation; and as it appears that a conſiderable quantity of Acorns was ſown among the planted Oaks, it is hoped due attention will be paid to the growth of all the trees, that the queſtion, long agitated among cultivators of Wood, *Whether it is beſt to raiſe Oaks immediately from the Acorns, in the ſpot they are to remain on, or to tranſplant*

tranſplant them from Nurſeries? may be decided, which Mr. Lloyd's experiment ſeems to afford a very convenient opportunity of doing.

SIR,

I Return you my beſt thanks for your polite attention to my letter, and have ſent you the certificates required; you will obſerve that the cover is directed by the ſame perſon that has examined the Plantation, for I thought it would be more ſatisfactory to have the circumſtances atteſted by a neighbour, that might be known as being in the public capacity of member for the county.

I confeſs my method of planting does not exactly coinſide with the article you tranſcribed; I have no ground of that ſort upon my eſtate, therefore apprehend that a field ſo ſituated, as to render improvement in Agriculture very expenſive and

difficult upon it, might be highly proper for the purpoſe I put it to, the cultivation of Oaks, eſpecially as the ſoil has been found extremely favourable to that kind of tree. Should any further account be neceſſary, you will oblige me by favouring me with a line, and it ſhall be immediately tranſmitted by,

Sir, your obliged

and obedient humble ſervant,

J. R. Lloyd.

Aſton (near Oſweſtry)
Nov. 17, 1787.

P. S. Mr. Davies, a neighbouring clergyman, and very reſpectable man, has done me the favour likewiſe to ſign the certificate.

Mr. More.

I hereby certify, that in the autumn of the year 1784, by order of the Reverend J. R. Lloyd, of Aſton, in the County of Salop, I planted ſixty-five thouſand four hundred and forty Oaks, of three and four years old, in a field belonging to the ſaid J. R. Lloyd, well fenced and ſecured from cattle, &c. and in ſize fifteen acres and three quarters; that the following autumn, I went over the ſaid Oaks, and ſowed an acorn by every ſickly plant, and further put down acorns within the Plantation, in different places, to the quantity of near ten buſhels: and I further certify, that the whole is now in a flouriſhing ſtate, and likely to become a fine wood, as witneſs my hand this 15th day of November 1787,

EDWARD WILLIAMS,

Late Gardener to the Rev. J. R. Lloyd.

I hereby certify that about ſix weeks ſince, I examined the above-mentioned Plantation of Oaks, belonging to the Rev. J. R. Lloyd, and believe the whole to be in a flouriſhing ſtate, as are likewiſe the plants which have grown from the acorns; that the whole is well fenced and ſecured from cattle, &c. and has been kept totally free from any treſpaſs, as far as I can perceive, and moreover that the ſaid Plantation is likely to become a fine wood; as witneſs my hand, this 15th day of November 1787.

J. FAYEL.

Preſent Gardener to the Rev. J. R. Lloyd.

The Certificates of the within mentioned Edward Williams, and James Fayel, were teſtified upon oath before me John Kynaſton, one of his Majeſty's Juſtices of the Peace for the County of Salop, this 15th day

day of November 1787. And having myſelf carefully examined the ſaid Plantation am fully ſatisfied of the truth of the ſaid certificates: given under my hand the day and year above written.

JOHN KYNASTON.

I hereby certify that the Plantation before-mentioned is well fenced, and has been kept ſo from the firſt of the trees being put down, and alſo that the whole is in a flouriſhing ſtate; as witneſs my hand this 17th day of November 1787.

W. DAVIES,

Vicar of St Martins in the County of Salop.

Aſton,

Aſton, December 19, 1787.

SIR,

WHEN I laſt had the pleaſure of ſeeing you in town, you deſired to have ſome account how my plantation of Oaks was made, which I ſhall endeavour to give, though I believe there will be found in it little or no deviation from the common method.

Some years ſince, I procured large quantities of Acorns from uncommonly fine Oaks in this neighbourhood, and immediately ſowed them in drills in my nurſery: I had them well cleaned the following ſpring when they came up, and the ground between the rows kept conſtantly free from weeds, while they remained in that place. The field where the Oaks now are, meaſures fifteen acres three rood, the ſoil ſhallow, upon a clay bottom mixed with ſtones, which previous

vious to its receiving the trees had undergone a regular courſe of tillage.

The Oaks, in number ſixty-five thouſand four hundred and forty, were planted in autumn, for each of which a hole was cut with a ſpade, and care taken to prevent the tap root being injured. The following autumn, an acorn was ſet near every ſickly tree, and a quantity diſperſed over the plantation to the amount of near ten buſhels in all: the whole has been kept regularly well fenced, and protected from cattle and treſpaſs of any kind; and as Oaks grow remarkably well in the neighbouring fields, in exactly ſimilar land, I may with ſome degree of reaſon conclude, that my plantation will be attended with ſucceſs.

I am Sir,

Your moſt obedient,

humble ſervant

Mr. More. J. R. Lloyd.

In the fifth Volume of theſe Tranſactions, a full account is inſerted of the large Plantation at Butsfield, belonging to THOMAS WHITE, Eſq; and this year the following Letter and Certificate of the planting fifty thouſand Oaks, on that eſtate being received, the Silver Medal was adjudged to Mr. White, on whom many honorary rewards have been already beſtowed for his attention to the views of this inſtitution, by cauſing ſuch extenſive and uſeful improvements to be made, and thereby ſetting a laudable example before his neighbours, who may be poſſeſſed of uncultivated, and unprofitable lands, in the northern parts of England.

I JOHN WEST, do hereby certify the having planted upon the eſtate of my maſter, Thomas White, Eſq. at Butsfield plantations, in the pariſh of Lancheſter, and county of Durham, fifty thouſand Oak Trees, fine healthy plants, which were previouſly raiſed and properly tranſplanted in a nurſery, the ſame being planted amongſt other trees over a conſiderable tract of ground at ſufficient diſtances to make timber, and properly fenced with a very ſubſtantial ſtone wall, and the buſineſs was performed between the fifth of February, and the fourteenth of March 1787, which plants are now in a very healthy and thriving condition; as witneſs my hand at Butsfield plantation, May the 12th, 1787.

JOHN WEST:

Planter for THOMAS WHITE, Eſq.

May

May 12, 1787.

I hereby certify that I ſeveral times viſited and inſpected Mr. White's Plantations, during the planting of the fifty thouſand Oak Plants, as above ſpecified, and I have every reaſon to believe that the above account is true, as witneſs my hand.

ROBERT DENT,
Curate of Lancheſter.

SIR,

BY the order of my maſter Mr. White, I have made bold to acquaint you for the inſpection of the Society, that after diligent ſearch amongſt the Oaks by me this year here planted, and previouſly certified for, that I have not been able to find twenty failing plants in the whole quantity, and they are more vigorous than any I ever before ſaw in the year wherein they

they were planted, the cauſe of which may chiefly be attributed to the wetneſs of the ſeaſon, which has cauſed this infant, though extenſive Plantation, to grow with more rapidity than in any foregoing year,

I remain for Thomas White, Eſq.

Sir,

Your moſt obedient,

humble Servant,

JOHN WEST.

Butsfield Plantation, near Durham, Aug. 16, 1787.

Mr. MORE.

It appears by the Society's Books, that three Gold Medals, and a pecuniary premium of thirty pounds, have been already beſtowed for planting Larch, and giving an account of the utility of the wood; and as the cultivation of that beautiful and uſeful tree, is extending itſelf much in many parts of the Kingdom, it is judged proper to ſubmit to the public, the following Extracts of Letters received from very diſtant parts of Europe, by which it will appear, that in the very different Climates of Venice and Archangel, the Larch has beenapplied to the conſtruction of Ships.—The advantages that may acrue to this Country, from this information, time only can render certain; but as the Larch is a tree of quick growth, and the wood of a firm and durable texture, it is not unlikely it may on trial, be found well adapted

adapted to many uſeful purpoſes in the conſtructing of the ſmaller kind of Veſſels, an object, it is preſumed of very conſiderable conſequence to the Mercantile Intereſt of theſe Kingdoms.

Extract of a LETTER from FRANCIS DENNISON, Esq. to Mr ALEXANDER SMALL, dated PETERSBURG, November 13, 1787.

DEAR SIR,

THIS is to acknowledge the receipt of the Letter you favoured me with ſome time ago, which my being out of the way prevented my anſwering before. The Larch, in this Country, is applied to no other purpoſe than that of Ship Building, to which uſe it anſwers perfectly well: Line of Battle Ships, are built of it in Archangel, which gene-

rally laſt fifteen years; but in milder Climates, no doubt, would laſt much longer. I wiſh you may ſucceed in growing this wood in England, as it would undoubtedly be of great utility: ſhould I have it in my power to give you any further intelligence in this particular, you may command me, and ſhall think myſelf highly favoured by your confidence.

In that excellent work, entitled Travels into Poland, Ruſſia, Sweden, and Denmark, interſperſed with hiſtorical relations and political enquiries, illuſtrated with charts and engravings, by Wm. Coxe, A. M. F. R. S. Fellow of King's College, Cambridge, and Chaplain to his Grace the Duke of Marlborough, in two volumes, quarto; vol. II. page 227, it is ſaid, "Ruſſia produces every arti-
"cle neceſſary for the conſtruction and
"equipment

" equipment of ſhips, which are chief-
" ly built at Cronſted, Peterſburg, and
" Archangel; thoſe conſtructed at Cron-
" ſted and Peterſburg, are framed with
" Oak; while thoſe from Archangel, are
" made with Larch-wood; the latter
" are much leſs adapted than the for-
" mer for an engagement. For the ſup-
" ply of the Dockyards at Peterſburg,
" and Cronſted, the Oak is ſent from
" the Province of Cuſan."

Extract of a LETTER, dated VENICE, May 23, 1787, from Mr RICHIE, his Majeſty's Chargé des Affairs there, to Mr STRANGE, &c. in anſwer to the query about the Larix.

HAving informed myſelf about the LARIX, which grows plentifully in the mountains of Friuli, and in many places of Dalmatia, I find it is ſome-

times employed in ſhip building, eſpecially in the lighteſt parts of the upper works, but not where maſſy pieces of timber are required, on account of its extraordinary weight, though where that makes no objection it may ſerve very well in almoſt any part of the conſtruction: It reſiſts the intemperature of the air, more than any wood known in this Country, and therefore it is much uſed in making outer Gates, Pales, and all other works which are conſtantly expoſed to the open air. It is no leſs durable within doors, and in ſome of the very old Palaces here, there are beams of Larix as ſound as when firſt placed. In a word, wherever ſtrength and durability are required, this is reckoned here the moſt choice wood they have, and may be applied to a great number of uſes. At Venice, they have great plenty of

of good Oak, and there being too little water on the bar, for large ſhips, excepting at ſpring tides, they are obliged to ſtudy lightneſs in the conſtruction of their ſhips, rather than ſtrength or duration, which not being the caſe generally in England, the Venetian practice, is not to be taken as a rule, but trial and experience muſt determine.

Gaining LAND from the SEA, has for ſome Years paſt been an object of the attention of the Society, and in the Year 1785, the Gold Medal was adjudged to Mr. JOHN HARRIOT, of Rochford, in Eſſex. See Vol. IV. Page 44.

This Year the following Account, with Certificates were ſent, but not being produced in due time, the Society could not conſiſtently with their Rules and Orders, adjudge the Gold Medal, which was the Premium offered, to this Candidate; yet in conſideration of the merit of the Work, the Silver Medal was voted to the Rev. HENRY BATE DUDLEY, from whom the papers were received.

Brad-

Bradwell Lodge, Eſſex, Octr. 4, 1787.

SIR,

I Requeſt that you will do me the favour to lay before the Society inſtituted for the Encouragement of Arts, Manufactures, and Commerce, the following ſtatement of the means I purſued in obtaining a certain tract of land from the Sea, in the Pariſh of Bradwell, juxta mare, in the county of Eſſex.

On coming to poſſeſſion (in 1781,) of the Glebe of the ſaid Pariſh, containing between three and four hundred acres, I found it in a deplorable ſtate of cultivation; the principal part of it being marſh land, bounded on the ſouthward by the German ocean, was ſo much impoveriſhed by ſpring, and autumnal landfloods, that the tenant was obliged to quit

quit the eſtate from inability to pay his rent.

Taking the Farm into my own hands, I ſoon perceived that good draining was the principal thing requiſite to bring the land into a proper ſtate of cultivation: I therefore ſet about widening and deepening all the marſh ditches, the ſtuff from which, with the old banks, which had probably remained unmoleſted for centuries, I carried into the middle of the lands, at not leſs than one hundred loads per acre.

After four years perſeverance, with a conſiderable ſtrength of men and horſes, I ſaw that all my endeavours would fall ſhort of the effectual improvement I propoſed, unleſs ſome method could be deviſed of carrying the land-floods more rapidly to ſea.

The

The ditches now made, in general ſixteen feet wide, and ſix deep, retained a vaſt body of water, the ſurface of which being nearly equal with that of the earth, kept the land in a conſtant ſtate of moiſture prejudicial to every ſpecies of Vegitation. I now diſcovered the cauſe of all the miſchief which my neighbours, as well as my own lands, had ſo long experienced. I found that the land in front of my ſea-wall, to the ſouthward (called faltings, from the ſea overflowing it except at low water) was grown higher than the marſh land within the wall; that the channels from the two ſea ſluices, dividing mine and the adjoining eſtates, to my right and left, were nothing more than the narrow irregular courſes, which the ebbing tide had marked, and therefore liable to be choaked up with the ſea-weed every north eaſt wind. And that even the ſluices themſelves were ſo ill contrived

trived and out of repair, as more frequently to admit the ſalt, than let out the freſh water.

It now occurred to me, that the only effectual means of curing the evil, would be to take the ſaltings in from the ſea, at the depth of fifty-ſix rods, and length of one hundred and twenty-ſeven, putting down more capacious ſluices at each angle of the advanced wall—cutting ſtraight channels through the new land to the ſluices, and making outfall courſes equally ſtraight and ſpacious, to convey the freſhes from the ſluices to the ſea.

Having laid my plan before the proprietors of the adjoining eſtates, they were ſoon convinced of its general utility, and liberally granted me two or three angles of their ſaltings, without which the work would not have been complete.

The

The annexed Certificate ſtates the particulars of the embarkment; to which it may be neceſſary to add, that the foreland, the part ſet off from the front of the wall, from which no earth is ſuffered to be dug into the work, as it would weaken the wall, is twenty-one feet wide; that the ſeating (between the inſide of the wall, and the delph or ditch for back water, for the ſame ſecurity) is eighteen feet. And that the whole work was compleated by eight men, with barrows and ſhovels only, in a few days over ſix months time.

Whether the improvement in Agriculture which I have thus related to you, Sir, will entitle me to the honorary reward of your Society, I know not; but be that as it may, I ſhall derive great ſatisfaction from having been enabled to lay before the members of ſo laudable an inſtitution,

an

an experiment which I flatter myſelf has proved ſerviceable to the country in which I reſide.

I have the honour to be with great reſpect,

Sir, your moſt obedient

humble Servant,

H. BATE DUDLEY.

MR. MORE.

Brad-

Bradwell, near the Sea, Eſſex, Sep. 29, 1787.

WE the underwritten, the Miniſter, Church Warden, and Overſeers of the Pariſh aforeſaid, do hereby certify, that between the Months of March and September 1786, the Rev. HENRY BATE DUDLEY, of Bradwell Lodge, did ſecurely encloſe in the ſaid pariſh of Bradwell, near the Sea, in the County of Eſſex, by an embarkment of ſoil only, a tract of land meaſuring forty-five acres, one rood, and twenty-five poles; which land, until ſuch encloſure, had been time immemorial overflowed by the ſea from the German ocean.

That the ſea-wall, now encloſing this recovered land, contains in length one hundred and eighty three poles; that its baſe is thirty-two feet, its height ſeven feet, and the top five feet wide. That it is the general opinion, the land ſo gained

is

is worth twenty ſhillings per acre, on a leaſe of twenty-one years.

That this work has greatly benefited and improved the whole level of marſhes, in the ſaid pariſh, as well as the adjoining one, by the conſtruction and poſition of the ſea-gutters or ſluices, in the ſaid ſea-wall, which are placed at the extreme end of the new-gained land next the ſea, whereby the freſh water is now carried to ſea with great facility, and the country no longer ſubject to thoſe inundations, which till this improvement, it always experienced at certain rainy ſeaſons. And we further certify, that to the beſt of our knowledge and belief, the whole of this improvement was effected at the following rates.

	£.	s.	d.
*144¼ Rods of Walling at 30 Shillings per Rod and 5 Guineas extra	221	12	6
One new Sea Gutter 5 feet clear run	60	0	0
Removing and altering another	10	0	0
Filling up Rills	50	0	0
Planks, Barrows and other tools	15	0	0
Carting do. and extra's	6	0	0
Total	£. 362	12	6

W. C. STANES, Miniſter.

G. KEYS, Churchwarden.

JONAS ROLPH, JAMES ROBINSON, } Overſeers.

* The Marſh Rod contains twenty-one feet.

In the IVth Volume of theſe Tranſactions, page 24, a Letter from Mr. John Ross, Profeſſor of Church Hiſtory in King's College, Aberdeen, is inſerted; wherein a ſhort hiſtorical account is given of the introduction of the Turnep-rooted Cabbage, into the northern parts of Great Britain, and ſome good effects of its cultivation in that Climate ſhewn. The following Letter from the ſame Gentleman, is a ſtill further proof of the utility of that Plant; and if it ſhall hereafter be found that it can be cultivated to advantage in the broad-caſt manner, hoeing the Plants properly, as is practiſed in the beſt culture of the common Turnep, Farmers in general may be induced to adopt it for Spring food for Cattle and Sheep, to which by its hardineſs, it is particularly and excellently adapted.—The experiments of Sir Thomas Beevor, hereafter

hereafter quoted, give great reaſon to believe this to be the caſe, although it is well remembered, that the late Mr. JOHN REYNOLDS of Adiſham in Kent, to whoſe care and attention the Kingdom is indebted for the firſt introduction of the Turnep-rooted Cabbage, for the purpoſe of feeding Cattle and Sheep, and who was rewarded by this Society with a bounty of fifty pounds, for his communications on that ſubject, was fully of opinion, that all circumſtances attending the Broad-caſt Culture conſidered, the cultivator would be more ſure of ſucceſs, if the Plants were raiſed on Seed Beds, and afterwards tranſplanted into Rows at proper diſtances, than if the common mode of ſowing Broad-caſt, and hoeing, was practiſed; as in this latter manner, there is certainly more danger of ſuffering injury by the Fly, than in the former one;

yet as the common Farmers will be moſt likely to cultivate this uſeful Plant, if they can do it advantageouſly, in the manner they have been accuſtomed to manage Plants with which they have been long acquainted; the Broad-caſt method, may be conſidered as advantageous; but it will be well worth the attention of gentlemen, to make a full and fair compariſon of the two methods, and ſhew to their neighbours which is the moſt profitable.

The Society, fully ſenſible of the merit of Mr Profeſſor Ross, have voted to him a Silver Medal, for his attention to the views of this Inſtitution, by introducing the culture of the Turnep-rooted Cabbage into the northern parts of the iſland of Great Britain.

SIR,

Aberdeen, Decr. 13, 1787.

SIR,

AFTER repeated trials of the Turnep-rooted Cabbage, in the counties of Aberdeen and Banff, I can now venture to aſſure you that they thrive extremely well in this northern climate; and that there is the greateſt probability of their becoming a very valuable acquiſition to Farmers, as a Spring food for Cattle and Sheep, after the Turneps are conſumed or become unfit for uſe.

For two or three years, thoſe who made trial of Turnep-rooted Cabbage, in this Country, raiſed them in the manner directed in the firſt Volume of your Tranſactions; but the trouble and expenſe of ſowing them in a Seed-bed, and afterwards tranſplanting them, diſcouraged many Farmers from attempting to raiſe

them in large quantities; to obviate which, a gentleman in this neighbourhood, made a trial about the beginning of June 1786, of ſowing ſome of the ſeed broad-caſt, in a field properly prepared for Turneps; and had the ſatisfaction to find that the crop ſown in that manner, and managed in the ſame way with the Turneps, was fully equal to that which he raiſed from Plants ſown in a Seed-bed in April, and tranſplanted about Midſummer.

This ſucceſsful experiment, I was about to communicate to you in February laſt, when the third Volume of Letters and Papers of the Society inſtituted at Bath, fell into my hands, which rendered the communication unneceſſary, as a moſt diſtinct and fatisfactory account is there given by Sir THOMAS BEEVOR, of his ſucceſs in raiſing them in the ſame manner for ſeveral years paſt.

A trial was made at Cullen Houſe, this laſt ſummer, to raiſe this valuable Plant, agreeably to Sir THOMAS's directions, and it has ſucceeded admirably.

A part of a field prepared for Turneps, was ſown broad-caſt about the middle of June, with the ſeed of the Turnep-rooted Cabbage, and treated in every reſpect, as to hoeing, thining, &c. like the common Turnep; and the crop which I ſaw about three weeks ago has turned out extremely full and rich.

Another trial was made at Cullen-Houſe, laſt Summer, by drilling the ſeed the middle of May, in ground properly prepared; the Crop was very fine, and the Cabbages grew to a great ſize, but a large proportion of them ran to ſeed, in the months of October and November; which convinces me that they were ſown

at too early a period; and that the moſt proper ſeaſon for ſowing them in this part of the Country, is from the firſt to the middle of June.

I have the honour to be with much reſpect,

Sir,

Your moſt obedient

and moſt humble ſervant,

JOHN ROSS.

Mr. More.

Few

FEW objects ſeem of ſo much importance to Agriculture, as the aſcertaining the comparative advantage, of the Drill and Broad-caſt method, in the culture of Wheat, Barley, Oats, Beans, &c. and in the Vth. vol. of theſe Tranſactions, an account is given of a large quantity of land having been ſown in Drills, by Mr. JOHN BOOTE, of Atherſtone upon Stour. This year the ſame gentleman, having cultivated (as appeared by the certificates ſent to the Society) four hundred and fifty Acres of land, in Drills, the Gold Medal, being the premium offered for comparative culture of Wheat, was adjudged to him; and theaccount of the experiment, and the ſucceſs attending is contained in the following Papers.

Atherſtone

Atherſtone upon Stour, near Stratford upon Avon, Warwickſhire, Feb. 2, 1788.

SIR,

ON peruſing the laſt Volume of Tranſactions of the Society for the Encouragement of Arts, Manufactures and Commerce, I find that my aſcertainments of drilled Crops, upon a ſcale of three hundred and ſixty-eight acres, in the year 1786, did not eſcape the notice of the Society. This encourages me to furniſh the Society with a further account of my ſucceſs in drilling, upon a ſcale of four hundred and fifty acres in the year 1787. From the time I had drilled the above three hundred and ſixty-eight acres, in the year 1786, to the time of harveſt, or ſo near harveſt, that the crops exhibited a ſtriking ſuperiority in favour of drilling, I ſuppoſe no one perſon in whatever enterpriſe or novelty he might be engaged,

was

was ever held more cheap or more vehemently exclaimed againſt, by all his neighbours than I was; as having acted with the greateſt impropriety, by trying the Drill upon ſo extenſive a ſcale.

At harveſt, their cenſures were ſomewhat abated, and they contented themſelves with obſerving, that though the Drill had for that ſeaſon, ſucceeded well with me, it might not ſucceed equally with them, nor in all ſeaſons. A ſuperiority in my drilling, compared with their broad-caſting, upon ſoils much ſuperior to ſome of mine, they were willing to acknowledge, but unwilling to attribute any merit to the ſyſtem of drilling, or the Machine that performed the work; nor could they think of any thing as the cauſe of ſo ſtriking a ſuperiority, but chance, or ſomething which they did not underſtand; and truly, in this ſomething which

which they did not underſtand, was compriſed the whole myſtery, viz. a regular diſtribution of conſiderably leſs than half the quantity of ſeed uſually ſown broad-caſt, and that at proper depths and diſtances in the land.

I will not ſay that ſo general a diſapprobation of the ſyſtem of drilling, together with the candid expoſtulations of ſome of my particular friends, who had an eye to the conſequences of the enterprife upon ſo large a ſcale, if it ſhould not ſucceed, would not have more or leſs cooled my zeal for the ſyſtem, at leaſt ſo as not to extend the ſcale of it the ſucceeding year, if I had not by actual experiments, comparatively made between drilling and broad-caſting, for more than ten years laſt paſt, in which the effects of wet and dry Summers, were particularly obſerved, compleatly made up my mind

mind on the ſubject; ſo compleatly, that nothing but the want of the Drill I am now in poſſeſſion of, would have prevented me putting the ſyſtem in practice upon the ſcale I now have it, ſeveral years ſooner. Surpriſing as it appeared to all my neighbours, that I ſhould hold out proof againſt all admonition, being frequently told that my obſtinacy would be my ruin, I had one ſupport unknown to them, in which I placed my whole truſt, viz. facts derived from experimental demonſtration: this was my ſtrong fort, which after weathering out many ſtorms and tempeſts, at almoſt every fair and market, covered my entrance into a ſafe harbour, at the end of the year 1786, with a clear profit of five hundred pounds for my ſupport, during the winter, and the ſupport of the drill-ſyſtem, the enſuing year: I mean five hundred pounds more than I ſhould have

have gained, if I had ſown my land broad-caſt.

Thus ſupported by facts and experiments, it cannot be wondered that I ſhould perſevere in a practice in which I had already been ſucceſsful, and againſt which nothing appeared, but opinions only, and thoſe for the moſt part, built upon weak foundations; opinions too weak to claim the attention even of a theoretic farmer, and lighter than wind itſelf, on the ſcale of a practical Driller.

And indeed, if all the world had been unanimous, as all my neighbours were, in their opinion againſt me, and I had been left alone in the field, as in fact I was, ſupported only by Mr Cooke's Drill, and a firm belief that ſimilar cauſes would produce ſimilar effects, I ſhould certainly have acted juſt as I have done.

I have already obſerved, that at the time of harveſt, 1786, the viſible ſuperiority of my Crops, put to ſilence all clamours againſt them; and many oppoſers (mortifying as it was to ſee the beſt Crops in all the Country, produced from ſoils ſo much inferior in quality as mine are to ſome of theirs) were forced into compliance. No ſooner were my Crops carried, and a greater number of Ricks or Stacks than uſual, preſented to the public view, but all cenſures againſt and objections to the Drill, not only abated, but were ſtrongly converted into a variety of queſtions and enquiries, viz. How is it poſſible? By what means can it be that ſo much Corn ſhould ſpring from ſo little Seed? and particularly ſo much more than uſual, from the ſame quantity of Land: Since this is the caſe, the beſt Farmers in the Country, are all in the dark; every one muſt learn his

buſineſs

buſineſs afreſh, with this general queſtion at parting, And do you really, Mr BOOTE, intend to continue practiſing the Drill ſo extenſively on your farm, for time to come? My anſwer in general was, Wait with patience, and you ſhall ſee. And accordingly I exhibited upon my farm, in 1787, four hundred and fifty acres of drilled Crops, growing at one and the ſame time, viz. Wheat, one hundred and twenty-ſix acres: Barley, one hundred and twenty-eight: Beans, forty-five: Peas, eighteen: Oats, forty-five: Vetches, ſix: Turneps, eighty-two.—As the reſpective Crops came into ear, a decided ſuperiority in favour of drilling, was again ſelf-evident, every obſerver became an admirer, the moſt ſtrenuous oppoſers became the moſt ſtrenuous advocates, and every one appeared anxious only to avail himſelf of the means of doing likewiſe.

From

From the time my Crops were drilled, to the time of harveſt, they were viewed by thouſands of ſpectators, many of them from afar; and to the beſt of my knowledge, not one of them went away diſſatisfied; and no wonder, for crops of Corn ſo luxuriant in themſelves, ſo far ſurpaſſing all my neighbours, at the ſame time produced from Land not of the firſt quality, could not fail to challenge the approbation of every beholder: And I humbly preſume that I might ſafely venture to challenge all the world to furniſh their equal, as to quantity and quality of drilled Corn upon one farm in one year. And I am confident I ſhall upon a fair calculation, gain by drilling, this year, viz. 1787, at leaſt ſeven hundred pounds more than I ſhould have done, if I had ſown my land in the uſual way: ſurpriſing as this may appear, it is not more ſurpriſing than it is true. And I

ſhould think the aſſertion can hardly fail of carrying conviction with it, eſpecially when it is conſidered, that Corn grown in the open field, carried in the open day, tythed in kind by the common tythingman, expoſed to view in barns and ſtackyards; threſhed, dreſſed, and meaſured, by common ſervants, and ſold to common purchaſers, will hardly leave room for a miſrepreſentation of facts, which ſpeak for themſelves in ſo many inſtances, and open to detection from almoſt every quarter, particularly the tythingman, who if he threſhed the Corn carried from my farm by itſelf, knows the quantity of my whole Crop as well as I do; and my books contain an exact account of every buſhel of grain ſold, and to whom. But if a miſrepreſentation ſhould even be ſuppoſed, I muſt beg leave to aſk, what intereſt can I have in deceiving the public? I may be blamed by

by ſome farmers, for having ſpoken thus openly, at the ſame time I am under no fear of being detected in an error by any. If others chooſe to ſmother and conceal their ſucceſs in drilling, I profeſs to be influenced by other motives, viz. the public good; and if I have any other gratification in thus communicating to the world theſe facts through the channel of the Society's tranſactions, it is that of being the firſt who has hitherto done it upon ſo extenſive a ſcale.

On peruſing the conditions upon which a premium is held out by the Society, for aſcertaining the moſt advantageous method of cultivating Wheat, by Drilling or Broad-caſting four acres of each: It was my intention to make the experiment accordingly, notwithſtanding I had reaſon to believe by the reſult of my laſt year's experiments, which the Society is

already in poſſeſſion of, I ſhould loſe ſixteen pounds by ſowing four acres broad-caſt, compared with the produce ſuppoſing it to be drilled; but as it happened, an opportunity offered itſelf of making the experiment according to the conditions held out by the Society, and without any loſs to myſelf, as follows, at the time I was drilling my land with Wheat, being about twenty acres in one piece, my next neighbour was ſowing broad-caſt a piece of land about eleven acres adjoining to it, the ſoils of both of the ſame quality, viz. a loam, only divided by a fence; the preparation of both pieces for Wheat, was the ſame, viz. Beans, with this difference only, that my neighbour's land was ſet by hand or dibbled and hoed; mine was drilled and hoed, his was alſo manured for Wheat after the Beans: mine was not manured at all: his ſown broad-caſt with twenty gallons

lons of ſeed to the acre: mine drilled with nine gallons and two quarts to the acre. During the growth of theſe two Crops, every attention was paid to the comparative experiment, not only by me, but many others. Until the firſt hoeing of the drilled Wheat was performed, the broad-caſt ſeemed to have the advantage from a greater number of plants appearing upon the land; but in a few weeks after the drilled Wheat was hoed, in the month of March, it exhibited a prodigious increaſe of ſtems, more vigorous of themſelves, and of a darker green than the broad-caſt; which preference was maintained until the time of harveſt. A little before harveſt, both Crops were viewed by many judges, and unanimouſly determined in favour of drilling, in the proportion of three to two, as Mr PAYTON of Stratford upon Avon,

has herewith certified; the above ſuperiority in favour of drilling, compared with broad-caſting, was nothing new to me, having uniformly experienced the ſame for ſeveral years upon different loams, which is the reaſon I had not a ſingle perch of broad-caſt corn, upon any of my loams, this year. If there remained any doubt with me, as to drilling having the advantage over broad-caſting upon any particular ſoils, it was upon cold ſtiff clays, which I had not an opportunity of trying till I had Mr Cooke's Drill.

The reſult of the firſt experiment I made between drilling and broad-caſting upon a cold ſtrong clay, the Society is already in poſſeſſion of: The reſult of the ſecond, will be found among my drilled Crops of the year 1787, which will accompany this letter. From every

every obſervation I have been able to make of the two laſt experiments upon clays, and my former drilling upon different loams, I am inclined to believe that there is hardly a piece of land to be found that will not admit of greater profits by drilling and hoeing, than broadcaſting, provided that drilling and hoeing are properly attended to. In proportion to the additional labour and expenſe required in cultivating clay ſoils in the uſual way, compared with tractable loams, ſo I have found the additional labour and expenſe of drilling and hoeing ſuch ſoils; at the ſame time it may be obſerved, that as clay ſoils are in general more productive than loams, particularly in Beans and Wheat, there is no fear but the cultivator will be well rewarded by ſuch ſoils for all his additional labour and attention.

I was ſo well ſatisfied with ſeventy-two buſhels per acre, of drilled Barley, in the year 1786, that I did not ſow one handful broad-caſt in the year 1787, though I had no ſooner finiſhed my Barley, but it occurred to me that an account of an experiment comparatively made between drilling and broad-caſting Barley, might not be unacceptable to the Society; on which account, I prevailed upon a neighbour, Mr WILLIAM GREENWAY of Alſcott, to make an experiment upon a piece of land joining to mine, and under the ſame cultivation; and excluſive of the hoeing not being performed in due time, he has authoriſed me to ſay that his drilled Barley yielded him ſixteen ſhillings per acre more clear profit than his broad-caſt Crop yielded. And as a proof of his being a convert to the Drill Syſtem, he has this year drilled

two

two thirds of his Wheat-crop, which looks as well as mine.

When I tranſmitted to the Society an account of my ſucceſs in Drilling in the year 1786, it was my intention to have taken a particular account of the expenſe of hoeing my drilled Crops in 1787; but this I found to be impoſſible, having ſometimes near one hundred men, women and children, who came at different times of the day (for I took in all that came for work) and were employed at different prices, ſome in one part of the field, ſome in another, and ſometimes altogether: and ſo ſtrenuous an advocate am I for hoeing, that if twice the number had applied for work, I believe I ſhould have employed them all, being fully convinced by paſt experience, that all the expenſe ſuppoſing it had been conſiderably more than it was, would be doubly repaid to me

me, not only in the preſent but future Crops. In favour of hoeing too much cannot be ſaid; the weeds that are ſuffered to bring their ſeeds to maturity, will ſtock the land with thouſands; by this means my neighbours lands are every year growing fouler and fouler, while mine by the weeds being cut up in their infancy, are growing every year cleaner and cleaner, excluſive of being under the neceſſity of making a Summer Fallow of ſuch lands every fourth or fifth year, with a clear loſs of a year's rent and much labour.

Upon ſuch of my lands as are already brought into a proper ſtate of cultivation, I am very certain I ſhall never make another Summer Fallow; being fully perſuaded, that where drilling and hoeing are properly attended to, and two exhauſting Crops never taken together, but an exhauſting and an ameliorating one

one alternately, there is not the leaſt neceſſity for it. If land is kept clean from weeds, and properly prepared by a ſufficient number of ploughings at ſeaſonable times, the cultivator may reaſonably expect a crop equal to the production of the ſoil: from whence it ſhould ſeem, that drilling has every way the advantage of broad-caſting; for in a remarkably dry ſeaſon when a Broad-caſt Crop is burnt up, and the cultivator only reaps a crop of weeds, ſuppoſing the Drilled Crop to ſuffer in the ſame proportion, which is in fact granting too much, for the grain of the Drilled Crop being depoſited at a proper depth in the ſoil where there is moiſture, the Crop will flouriſh, while the Broad-caſt Crop will ſuffer: But even ſuppoſing the Drilled and Broad-caſt ſhould equally ſuffer in a dry Seaſon, if the cultivator makes all the uſe of the Hoe, which a burning Seaſon admits

admits of, in deſtroying the weeds and working the ſoil, and the Crop after all ſhould fall ſhort of his expectations, he has the pleaſure at leaſt of ſeeing his land cleared of weeds, which will be the contrary with the broad-caſt Crop, where the failure of a crop of Corn is uniformly productive of a crop of Weeds: He will have the ſatisfactionof conſidering, that in whatever proportion his preſent Crop may fall ſhort of his expectations, if his land has been properly hoed and kept clear from weeds, he has reaſon to expect that his next ſucceeding Crop will be the more abundant.

When Land is laid down with Graſs-ſeeds, it is uſual to ſow the Seeds when Barley is ſown; but in Drilling, if Graſs-ſeeds are ſown when Barley is ſown, the hoeing cannot take place, therefore ſoon-

er

er than be debarred from hoeing, I determined to try the method which Mr. COOKE has publiſhed, of deferring to ſow Graſs-ſeeds until the ſecond hoeing of the Barley was juſt going to be performed, about the beginning or middle of May, at which time I ſowed ſeventy-two acres of Barley and Oats, with Graſs-ſeeds, and hoed them in at the laſt hoeing about the middle of May; and I have the pleaſure to ſay, that I would not wiſh to ſee a better plantation of young Clover than I have now growing upon ſeventy-two acres ſown as above.

I have often heard it aſſerted that there could not poſſibly ariſe any advantages from drilling Turneps, but from the ſucceſs which I had in drilling eighty-two acres with Turneps; I am of a very different opinion. The advantages chiefly conſiſt of depoſiting the Seed at a proper depth

depth in the ſoil, about two inches, where there is moiſture in a dry Seaſon to ſend the plants up in a few days; whereas, if they were ſown broad-caſt in a dry Seaſon, the Seed might remain in the ſoil ſeveral weeks waiting for rain to make them vegetate; and the Seed being depoſited at one and the ſame depth, will vegetate not only more expeditiouſly, but at one and the ſame time; and by getting into the rough leaf the ſooner, will ſtand a better chance of eſcaping the fly. I would nevertheleſs by no means be underſtood to infer that by Drilling of Turneps, the effects of the fly are entirely removed, notwithſtanding in ſome very dry ſeaſons, it may ſo happen by the plant getting into rough leaf before the fly begins to exiſt, by reaſon of the Seed being depoſited at a regular depth, where there is moiſture in the ſoil, but in regard to hoeing of Turneps that are drilled, the advantages

tages are conſiderable, the ſpaces between the rows will be hoed in half the time that would be required, ſuppoſing they had been ſown in the common way, and when they come to be ſet out at proper diſtances, in the rows, the ſuperfluous plants will be cut out in one third of the time uſually required, and that by women or children; this I experienced in my Turnep Crop which was required to be hoed in the moſt buſy time of my harveſt, and was done by women and children: whereas if they had been ſown broadcaſt, I ſhould have been under the diſagreeable neceſſity of ſending a number of my beſt workmen to hoe Turneps.

It may appear ſomewhat extraordinary that I have not fail'd, in any one ſeaſon to raiſe a valuable Crop of Turneps for fourteen years laſt paſt, and in my method of cultivating Turneps, I am tolerably

ably eaſy as to all apprehenſions of the effects of the fly, which is looked upon by moſt Farmers as a very ſerious affair: this method I would have deſcribed at large, but leaſt I ſhould be too troubleſome to the Society, I will defer it until ſome future opportunity,

I am Sir,

your very humble Servant,

JOHN BOOTE.

MR. MORE.

Account

Account of Mr. JOHN BOOTE, of Atherſtone upon the Year 1787, by a Drill Machine

	Meaſured. R.	P.	Produced. Buſh.	Gal.	Pts.	Prod. per Acre. Buſh.	Gal.	Pts.
No. 1	1	27	24	2	3	58	0	1
2	1	4	9	7	2	36	0	1
3	1	0	12	5	5	50	6	4
4	0	38	17	7	6	75	5	2
5	1	34	27	0	6	58	4	4
6	1	9	15	6	3	51	4	5
7	2	26	16	7	2	25	4	1
8	3	24	12	4	1	13	7	2
9	1	6	13	1	0	45	5	1
10	1	8	22	5	1	75	3	6
11	1	29	33	1	1	76	6	6

N. B. of never taking two exhauſting to a regular rotation of Crops.

The above workmen examined by me

JOSEPH BARBER.

Wimpſ

THIS is to certify, that I viewed, at the requeſt of Mr JOHN BOOTE of Atherſtone upon Stour, near Stratford upon Avon, on the 3d day of Auguſt 1787, his experimental Crop of Drilled Wheat, and his neighbour's Broad-caſt, in the adjoining field; when to the beſt of my judgment, there appeared to be an evident ſuperiority in favour of the drilled Crop, of one third at leaſt. The Straw and Ears of the drilled Wheat, nearly twice the length and ſtrength of the Broad-caſt ones. I rubbed out the Corn of ſome of the Ears of both Crops, and found, upon the average, ſeventy grains in each Ear of the Drilled, in the Broad-caſt, thirty-five; and neither ſo bright, not ſo large, nor ſo well vegetated as the Drilled. Afterwards I went through ſeveral other Crops of the ſaid Mr BOOTE's drilled Wheat, as well as Broad-caſt Crops belonging to other neighbours;

and to my great ſurpriſe, found there a proportionable ſuperiority; which has made me a convert to Drilling.

JOHN PAYTON.

Stratford on Avon,
Feb, 2, 1788.

AFTER a due examination of the foregoing Papers by the Committee, to whoſe conſideration the buſineſs was referred, the Secretary was directed to write to the Candidate, requeſting him to inform the Committee

" Whether the 2 R. 26 P. drilled on
" poor clay, No. 7, and the 3 R. 24
" P. ſown broad-caſt, No. 8, were
" the whole of the land ſo drilled
" and ſown in the ſame ground? and
" if not, what was the whole quantity
" of each? And a letter was alſo writ-
" ten

" ten to Mr. Payton, deſiring him to
" inform the Committee, whether he
" ſigned the Certificate, and requeſting
" him to take the trouble of enquiring
" of the neighbour alluded to in Mr.
" BOOTE's Letter, and his own Cer-
" tificate, whether the ſoil of his land
" is ſimilar to Mr. BOOTE's? Whether
" it was cultivated with beans in the
" preceding year and manured pre-
" vious to its being ſown with Wheat,
" as ſet forth in Mr. BOOTE's Letter?
" and ſhould the neighbour have thraſh-
" ed the Wheat grown in the Field,
" it will be highly ſatisfactory to the
" Committee to be informed, what
" was the average produce per acre?
" and that it is wiſhed ſuch neighbour
" would atteſt theſe matters under his
" own hand."

In anſwer to theſe queſtions, the following Letters were received.

Stratford upon Avon, Feb. 15, 1788.

SIR,

AGreeable to your requeſt, I take this opportunity of aſſuring you that I ſigned Mr BOOTE's Certificate. — You likewiſe deſired me to enquire of the neighbour alluded to, in Mr BOOTE's Letter and my own Certificate, whether the ſoil of his land is ſimilar to Mr BOOTE's? he acquaints me it was as nearly as poſſible.—That it was dibbled with Beans the preceding year, and manured previous to its being ſown with Wheat.

He has not thraſhed the Wheat grown in that field, but as near as he can poſſibly calculate, he believes that it will not produce twenty-four buſhels per acre.

Mr

Mr SALMON, who is the neighbour alluded to in this Letter, hath joined his name with mine, as a full conviction of the circumſtances that are here related.

I am, Sir,

Your moſt humble ſervant

JOHN PAYTON.

THOMAS SALMON.

MR. MORE.

Atherſtone upon Stour, Feb. 28, 1788.

SIR,

I Was not at home when your favour of the 12th arrived, or I would have anſwered it ſooner. Not being upon the field when the broad-caſt Wheat, No 8, was ſown, I examined my ſervants reſpecting the quantity of land ſown; to my great ſurpriſe, and contrary to my intention, find the Broad-caſt meaſures four acres forty perch; the Drilled, ten acres three rood: and as a confirmation of the above, CHARLES CHAPMAN and THOMAS PITOWAY, who performed the buſineſs, have here ſigned their names with me.

I am, Sir,

Your very humble ſervant,

JOHN BOOTE.

CHARLES CHAPMAN.

THOMAS PITOWAY.

MR MORE.

IN

IN the former Volumes of theſe Tranſactions, mention has been made of a large ſpecies of Hemp growing in China, and of which ſome Seeds were ſent to the Society by the Eaſt India Company, and diſtributed to the Members and other Gentlemen who appeared likely to cultivate them: Notwithſtanding the Plants grew well in moſt places, yet the Society have not received any account of the Seed ripening, except what is contained in the following Letters from Dr. HINTON. As it now is evident that this Plant may be brought to maturity in this Climate, it remains only to be ſeen whether it will continue to retain its great ſize, or will diminiſh and become the ordinary Hemp of Europe; and this, the experiments the learned Cultivator promiſes to make, will in a few years determine.

At the cloſe of the account of the Chineſe Hemp, in the firſt Letter, will be found a few comparative obſervations on the Drill and Broad-caſt Huſbandry, from experiments duly and accurately made; and as every circumſtance that may tend to elucidate ſo deſirable a point in agricultural purſuits, as aſcertaining the comparative advantages of the two methods, are at this time highly acceptable to the Publick, they are here inſerted.

The

The SILVER MEDAL was voted to the Rev. Dr. HINTON, for his attention to the culture of the Chineſe Hemp, and the other obſervations contained in his Letters.

Northwold, near Brandon,
Jan. 14, 1788.

SIR,

THE Chineſe Hemp Seed, you ſent me, was ſown May 17, 1786, on a rich open ſoil proper for the growth of Hemp, which had been properly manured and cultivated. There was no appearance of vegetation until June 6th, when a few weak Plants came up. Theſe, notwithſtanding ſome fine ſhowers, which fell about that time, retained ſo ſickly a complexion, and had on the whole ſo unpromiſing an appearance, that deſpairing of ſucceſs I abandoned the experiment.

Buck-

Buck-Wheat was then harrowed into the land for a Fallow Crop. In the beginning of October, the perſons employed in cutting the Buck-Wheat, diſcovered ſome Seed in the heads of ſome ſtraggling Hemp Plants which had been ſuffered to grow in the crop; theſe, carefully threſhed, yielded three pints of ſeed tolerably bright and heavy. May 10, 1787, the Seed laſt mentioned, was ſown on good land in high condition: May the 19th, there was a plentiful ſhoot of healthy Plants, which grew vigorouſly all the ſeaſon. Auguſt 13th, the Thimble or Male Hemp, was drawn, as on October the 9th, was the Carle or Female Hemp. The whole was put under the care of Mr Negus, a conſiderable grower and manufacturer of Hemp, at Market Downham, who ſtruck with the flouriſhing appearance of the growing Crop, came

and

and requeſted to be entruſted with the management of it when ripe.

The ſpot on which the Seed was ſown contains three hundred and twenty two ſquare yards, and produced of Hemp fit for market, or in a ſtate which would juſtify the claim of the grower to the parliamentary bounty, eighty-nine pound, or per ſtatute acre, ninety-five ſtone ſeven pounds and twelve ounces; and of Seed, three pecks and one pint, or eleven buſhels, two pecks, and half a pint per acre.

On enquiry, I find that the produce of the beſt Hemp Crops in this part of the kingdom, ſeldom exceeds ſixty ſtone per acre.

The Hemp raiſed in 1786, from the Seed I received from you was apparently of little value, and from the miſmanagement of the perſon who undertook to water

water it, was abſolutely ſpoiled. I am not competent to decide on the comparative qualities of Hemp raiſed from Engliſh and Chineſe Seeds; in point of quantity, the latter has evidently a ſuperiority: I conſider it therefore as a matter of ſome conſequence, to ſhew from actual experiment, that this more productive kind, has yet retained its ſpecific difference when cultivated in this Country; how long it will continue to do ſo, remains to be proved. I intend to ſow the ſeed in ſucceſſive Crops, until it degenerates; taking great care, as I did in the firſt inſtance, to ſow it in a ſituation where the Plants cannot be affected by the farina of Engliſh Hemp.

From the general fortune of the ſpecimens of the original Seed diſtributed by the Society, a ſuſpicion has, I find, ariſen

that

that the Chineſe had taken effectual means to defeat the intention of the Engliſh purchaſers, perhaps the national character of that people ſtrengthened this ſuſpicion.

I am now perſuaded the failure may reaſonably be aſcribed to other cauſes: I ſuſpect the ſeed I received was at leaſt two years old; our Hemp growers are decidedly of opinion that no dependance for a Crop can be had on Seed of that age: To this unfavourable circumſtance may probably be added the want of due care and attention in packing up the Seed ſo as to ſecure it in the moſt effectual manner from the injury of a voyage from the Eaſt Indies: Hemp-ſeed from its peculiar nature is ſuſceptible of ſuch injury.

Should

Should the Committee of Agriculture think proper to apply for a further ſupply, I dare ſay they will give proper directions on this point.

I am, Sir,

Your very humble ſervant,

WILLIAM HINTON.

MR. MORE.

COM-

COMPARATIVE EXPERIMENTS

In ſowing Wheat by a Drill and by Broad-caſt, at Northwold.

EXPERIMENT No I.

November 2, 1784, ſowed by the Drill one buſhel, two quarts, and half a pint of Wheat, per ſtatute acre; which produced forty-four buſhels and two quarts. Sowed Broad-caſt one buſhel and twenty-ſeven quarts of Wheat per acre; which produced thirty-eight buſhels, eighteen quarts: The land good ſandy loam-fallow. The difference in favour of the Drill, is five buſhels ſixteen quarts.

EXPERIMENT No II.

Soil, rich loam Lea, of the firſt year. October 12, 1785, ſowed by a Drill, one buſhel, two quarts, one pint and a half of Wheat per acre; which produced forty-ſix buſhels and two quarts. Sowed Broad-

Broad-caſt, two buſhels and five quarts per acre; which produced forty-one buſhels and five quarts. Difference in favour of the Drill, four buſhels and twenty-nine quarts.

Experiment III.

Fallow, open field, ſoil light, rather ſandy: October 20, 1786, ſowed by a Drill, one buſhel, three quarts of Wheat per acre, which produced twenty buſhels twelve quarts. Sowed Broad-caſt, two buſhels, two quarts per acre, which produced eighteen buſhels, four quarts. Difference in favour of the Drill, two buſhels eight quarts.

Theſe annual experiments were reſpectively made on contiguous parts of the ſame field, manured alike with ten cart loads of good ſpit yard dung per acre, and

and under the ſame cultivation. The Drilled Crop, No I. was hand-hoed three times. No II, and III. hand-hoed twice. Theſe operations coſt from ſixteen to eighteen-pence per acre. The Broad-caſt was carefully cleaned of weeds by hand, and coſt from ſeven ſhillings to ten ſhillings per acre: a great price! yet not unuſual in a county like this, overrun with red weeds.

The ſoil of Northwold is, I think, peculiarly adapted for the Drill-huſbandry, conſiſting generally of loams of various qualities, and free from ſtones; ſo that at all times, except hard froſt and wet ſeaſons, the Hoe can be worked to advantage. I have drilled Barley, Rye and Buck-Wheat, alſo Peas, on a turf ten years old, all with ſucceſs and an evident ſuperiority over my own adjoin-

ing Broad-caſt Crops, as well as thoſe of my neighbours.

But as I apprehend that comparative experiments form the moſt certain teſt, by which the merits of the two different modes of ſowing, can be determined, I ſhall ſay no more on the ſubject than that I now drill all my Corn Crops. You will pleaſe to obſerve that I confine my practice and opinion to my own ſpot, not preſuming to ſay that the Drill Huſbandry is generally proper to be purſued under all circumſtances.

You will receive ſpecimens of the Hemp per Swaffham Waggon.

North-

Northwold, Feb. 20, 1788.

SIR,

I Have ſent you a ſpecimen of the Hemp Seed raiſed in 1787, from the produce of Chineſe Seed, ſown here in 1786.

The Crops of 1787, were cultivated in all reſpects as thoſe of Engliſh Hemp are: The Land, which, I have obſerved in a former Letter, was of a good quality and in high condition, was harrowed fine; the Seed was ſown Broad-caſt, thick; the Plants, when up, were hoed and ſet out at a medium diſtance of ſeven inches aſunder. To this circumſtance I aſcribe the great length of the Stem, and the tenuity of the fibre of the Hemp: Had a much greater ſpace been aſſigned, I am perſuaded the Plants would have abounded with ſtrong lateral branches—which

are in general unproductive of Hemp; and beſides, break the ſtaple of that which grows on the ſtems.

I am, Sir,

Your moſt humble Servant,

WILLIAM HINTON.

Mr. More.

PAPER

PAPER

IN

CHEMISTRY.

CHEMISTRY.

THE many and great uſes to which Alkaline Salts are applied in various branches of Manufacture, as Soap making, Glaſs making, Bleaching, &c. &c. have rendered theſe Salts an object of the Society's conſideration; and different premiums have been offered with a view to the obtaining them at a cheaper rate than they have hitherto been ſold at. Among others, the Society in the year 1776, firſt offered their GOLD MEDAL, or THIRTY POUNDS, to the perſon who ſhould import into the Port of London, in the year 1777, not leſs than ten hundred weight of native foſſil fixt Alkali,

the produce of any part of the Britiſh Dominions in the Eaſt Indies, and fit for the purpoſe of Soap Makers. This Premium was continued without any claim being made for it, to the year 1785, and then diſcontinued.

Towards the latter end of the laſt mentioned year, an account was received by the Society, that a quantity of native foſſil Alkali, had been ſent from Bombay, by HELLENUS SCOTT, Eſq; Surgeon there: And in April 1786, about three hundred weight, part unrefined and part refined, was by order of the Court of Directors of the Honourable Eaſt India Company, delivered to the Society; who having procured trials to be made of its properties, and its value aſcertained by ſome very ingenious Chemiſts and Manufacturers. Reſolved, "that this ſubſtance being a

"mild

" mild foſſil Alkali, would prove a de-
" ſirable article in Commerce, provided
" its price did not exceed that of Ba-
" rilla; and being the produce of one
" of the Britiſh poſſeſſions in the Eaſt
" Indies, it would be moreadvantageous
" to have the Alkali from thence, than
" to purchaſe Barilla, from foreign
" Parts, often at an exorbitant price."

The Society therefore preſented their SILVER MEDAL to Mr SCOTT, for his having produced to them this ſample of native Indian foſſil Alkali.

The

The following Letters and Papers, contain the opinions of ſome perſons of eſtabliſhed abilities, communicated to the Society on this ſubject.

THERE are few articles of more extenſive utility to mankind, than Alkaline Salts; and perhaps there is no Country in Europe, where they are more generally uſed, or produced in ſmaller quantity than they are in England. They are abſolutely neceſſary in Dying, in Medicine, and in making of Glaſs; they are alſo the baſis of Soap and Leys, beſides their uſe in a variety of arts. For theſe reaſons, every Society with us, for the improvement of Commerce and the uſeful Arts, has offered premiums for the production of theſe Salts in the Britiſh Dominions, but hitherto they have not ſucceeded. They have indeed from vege-

vegetable matters, been able to make ſome quantity of the vegetable Alkali, like the Potaſh of the northern Countries, but they have not been ſo ſucceſsful with regard to the foſſil Alkali, which is of the ſame nature as the Barilla of Spain. We therefore are obliged to depend on Ruſſia, and the nations on the Baltic, for the vegetable Alkali; and on Spain, and the Countries on the Mediterranean, for the Foſſil. This has made the laſt mentioned kind ſo dear, during the war, that many Manufactures depending on it, have been entirely ſuſpended.

From theſe conſiderations, it might be a deſirable thing to ſend from this Country, (Bombay) a Salt of that nature. By the experiments I have made, it appears we have a good foſſil Alkali produced here in a rude ſtate, of the ſame qualities with the Alkali of Spain, and fit for all the purpoſes

purpoſes in arts to which that Alkali is applied.

Since I firſt mentioned to ſome gentlemen here, the advantages that might be derived from purifying this article, and ſending it to England; I have learned that it now is ſent from Bengal, by contract, and in conſiderable quantities, at the rate of twelve Rupees, a Maund of nearly eighty-two pounds averdupois.

The quantity of Salt that might be got here every year muſt be conſiderable, and may amount to four or five hundred tons or more; as it would anſwer for veſſels deficient in their loading, the expenſe of tranſporting it could not be great.

I therefore beg leave to offer to your Honourable Board, to ſupply the Company

pany with the quantity of two hundred tons every year, or with a greater quantity if it is deſired and can be procured; and this at the rate of three hundred Rupees a ton, which is fifty leſs than is allowed at Bengal, for the ſame quantity.

I doubt not, in caſe this propoſal appears reaſonable, your Honours will afford every encouragement for its advancement, as it has for its object the production of an article the moſt neceſſary in many of the arts of life, in a Country where they have arrived at the higheſt perfection, and where it is by nature almoſt entirely denied.

I ſhall only take the liberty to add, that as the Salt with which I propoſe the Company ſhould be ſupplied, will in no reſpect be inferior to the Salt of Bengal, as the coſt of it will not be greater, if ſo great;

great; and as the quantity will be very conſiderable, I humbly ſuppoſe the ſame advantages may be procured by ſending it from this Coaſt, as from the other ſide of India.

Bombay, January 2, 1785.

SIR,

I Did myſelf the honour of writing to you about a month ago by the Reſolution Indiaman, Captain TOLMEY, and ſending a box of native Foſſil Alkali, which I ſuppoſe before the arrival of this letter, has been preſented you by Leiut. General MELVILL. I informed you, that on this Coaſt, I had obſerved the natives in the uſe of waſhing their cloaths with a brown earth, which on examination, I found to be a native fixed Alkali.

As

As this ſubſtance, I believe, has been much wiſhed for as a product of ſome part of the Britiſh Dominions, I have propoſed ſupplying it to the extent of many hundred tons, every year, on the Company's account. The Honourable the Governour and Council, have ſent that propoſal home for the conſideration of the Court of Directors.

At preſent, I ſend a box of this Alkali to the Society for the Encouragement of Arts, Manufactures and Commerce, in hopes that learned Society, will conſider it a matter of uſe as well as curioſity; and that they will recommend a propoſal to the Court of Directors, by which an inexhauſtable ſupply of that moſt uſeful article, will ariſe to the Nation, in time of war as well as in peace.

As the ſhips from this Coaſt, ſeldom go home fully laden, it might be taken in

in as ballaſt, by which the expenſe of tranſporting it would be inconſiderable.

In the ſtate in which I have ſent this, it would not exceed one hundred Rupees a ton, and perhaps is pure enough for many Manufactures. I have before informed you that this Salt is found in Sindy, in the ground near the ſea, from whence the natives dig it.

If the Society for the Encouragement of Arts, Manufactures and Commerce, ſhould honour me with any information on this ſubject, (as whether it would be proper to purify it farther before ſending it home; or whether in this ſtate, as it is cheaper and more fit for carriage, it is to be preferred.)

My addreſs is, Mr Scott, Surgeon, Bombay.

I am, Sir,

Your obedient Servant,

H. SCOTT.

Bombay,

Bombay, November 20, 1784.

SIR,

THE attention paid by the Society for the Encouragement of Arts, Manufactures and Commerce, to Alkaline Salts, made me firſt think on that ſubject in this Country; I therefore beg leave to lay before you a diſcovery I have made of great quantities of a foſſil Alkali, produced on this Coaſt by nature, and not the product of fire. I venture to call this a diſcovery, as I am, as far as I know, the firſt European who has been acquainted with the qualities of this ſubſtance.

When I arrived in India, I ſaw in common uſe among the natives, a Soap manufactured on this Coaſt, but I never could procure any of the Salt of which it is compoſed. I alſo had heard of Glaſs being made at Surat. A long while af-

terwards, I obſerved that the natives are in the uſe of waſhing their cloaths with a brown earth brought from Sindy. I found this to be a foſſil Alkali, with a conſiderable portion of earthy and vegetable matters.

This Salt is produced in pits near the ſea, and in immenſe quantities. I believe it might be procured to the extent of many thouſand tons every year. Thinking from the immenſe quantities of this Salt, and from its particular nature, being a native foſſil Alkali, it might become an object of publick uſe, I laid before the Honourable the Governor and Council here, the propoſal which I have encloſed. They have referred the matter to the Court of Directors, only agreeing to ſend home a ſmall quantity every year as a ſpecimen, until their pleaſure is known.

By

By the Company's ſhip Reſolution, I have ſent a box of the Alkali, in the ſtate in which it is found in Sindy, to the Society for the Encouragement of Arts, Manufactures and Commerce. The Salt in this degree of purity, would not exceed one hundred and fifty Rupees a ton. Perhaps the beſt ſtate to ſend it home in, might be that in which is has received a ſimple waſhing; as it is in that ſtate not liable to receive any damage, and would be cheaper than what has undergone the operation of roaſting. This I ſuppoſe would be ſufficiently pure for moſt of the purpoſes in the arts.

I cannot help remarking that I find a remarkably ſmall proportion of this NATRUM, ſufficient to ſaturate oil: perhaps this particularity may ariſe from the Cocoa-nut oil, which is the only kind I have uſed. If the learned Society for

the Encouragement of Arts, Manufactures and Commerce, ſhould think that this diſcovery may be of uſe to the publick, as opening an inexhauſtible ſupply in all times, of a moſt uſeful article, I requeſt they will take ſome notice of it to the Court of Directors, as without their encouragement it muſt be entirely loſt.

I am Sir,

Your obedient Servant,

H. Scott.

Mr. More.

Near

Near Birmingham, April 26, 1786.

DEAR SIR,

I Received your favour of the laſt month mentioning that you had ſent me two ſamples of foſſil Alkali, brought from Bombay, and that the Society for the Encouragement of Arts, are deſirous of having them examined to enable them to judge whether they may become an advantageous article of Commerce. You expreſs a wiſh that the report I ſhall make of my trials of this Alkali, may be explicit; and I hope in this, and in other reſpects, you will perceive the readineſs and pleaſure with which I endeavour to comply with your and the Society's intentions.

I firſt examined the ſample that was marked REFINED; from the taſte, I per-

ceived it was a mild Alkali; and from the dry powdery appearance, I knew it to be of the MINERAL or FOSSIL kind. To determine its ſtrength and purity, I made the following experiments.

EXPERIMENT I.

I diſſolved ten ounces of this Alkali, and I found it totally ſoluble, excepting a very ſmall ſediment, not exceeding half a grain in weight. This ſediment being diſſolved by vitriolic acid, yielded a blue Precipitate, on adding the Pruſſian Alkali, and may therefore be concluded ferruginous. But the quantity is too ſmall to deſerve any conſideration, with reſpect to the uſe of this Alkali in arts, and I ſuppoſe it either proceeds from the iron tools and veſſels uſed in its preparation, or may be ſome veſtige of the ferruginous clay

clay with which the Alkali is mixed in its unrefined ſtate, as I ſhall afterwards ſhew.

I ſet the ſolution of the Alkali in a cool place to cryſtalize, and I obtained ſome very pure cryſtals of mineral Alkali. The remaining ſolution having been evaporated a little, yielded upon cooling, more of the ſame cryſtals. Upon expoſing the liquor to a further evaporation, a cruſt or pellicle of another Salt was formed, and the cryſtals of Alkali, which formed upon cooling, were leſs diſtinctly ſhaped than the former, on account of the other Salt, which impeded the cryſtalization and perfect ſeparation; and which appeared to be chiefly, if not entirely, marine or common Salt. The pure cryſtals obtained by the two firſt operations, and which from the peculiar form of the cryſtals, were eaſily and certainly known to be mineral Alkali, weighed eight

ounces and a half. But as ſome Alkali remained in the liquor, we cannot from this experiment infer the quantity either of the Alkali or of the neutral Salt with which it is mixed.

Experiment II.

In order to determine the ſtrength of this refined Indian Alkali, I diſſolved a given quantity of it in water, and I found by ſaturating it with vitriolic acid, that one hundred parts of this Alkali, require for their ſaturation, fifty-three parts of vitriolic acid, whoſe denſity compared with that of water, is in the proportion of eighteen hundred to one thouſand.

As I knew from former repeated experiments, that one hundred parts of perfectly dry and pure mild mineral Alkali (that is cryſtals of Alkali dried as much as

as they can be, in which ſtate they loſe their form, and become an opake white powder) require ninety parts of vitriolic acid, of the above denſity for their ſaturation; and as it appeared from the above experiment, that fifty-three parts of this acid were ſufficient for the ſaturation of one hundred parts of the Indian refined Alkali. I inferred that ninety parts of this Indian Salt contains as much Alkali as is equal to fifty-three parts of perfectly dried mild mineral Alkali; or that a hundred parts of the Indian Salt contain fifty-eight eight tenths of ſuch dry Alkali; alſo becauſe the whole of the ſubſtance from India, was ſoluble, I inferred that the remaining forty-one two tenths out of the hundred, were water or neutral Salt, or both.

Experiment III.

I had no doubt but ſome water was contained in this Indian Alkali, therefore in order to find the quantity, I weighed four troy ounces of the Salt, and kept it expoſed during two days, to warm air; encreaſing the heat by degrees, until it equalled that of boiling water: by this operation, the four ounces were reduced to three ounces and one penny weight; that is, the loſs of weight or quantity of water expelled from this Salt by hot air, was nearly twenty-four hundredths of the whole quantity employed: Hence the remaining ſeventy-ſix hundredths were dry mild Alkali and neutral Salt. But as fifty-eight, eight tenths, were found by the former experiment, to be dry Alkali, the neutral Salt muſt be ſeventeen two tenths.

Ex-

Experiment IV.

It remained to be determined of what kind the neutral Salt, or Salts were, if there ſhould be more than one which are mixed with Indian Alkali.

For this purpoſe, I ſaturated one troy ounce of this Alkali, with diſtilled vinegar; and I added to the ſaturated ſolution, drops of a ſolution of ſugar lead, until no more precipitate was thrown down. This precipitate, when dried, weighed fifty-eight grains: I then added in the ſame gradual manner, a ſolution of ſilver in nitrous acid, and the precipitate, when dried, weighed one hundred and ſixteen grains.

In order to know whether the firſt precipitation was occaſioned by a vitriolic Salt:

Salt, I tried to diſſolve this firſt precipitate, in diſtilled vinegar and pure water; and finding that it was ſoluble, I concluded that neutral Salt which the ſugar of lead had decompoſed, was not a vitriolic Salt (for the vitriol of lead is not ſoluble) but a marine Salt; and as the Salt which was decompoſed by the ſolution of ſilver, was alſo a marine Salt, I concluded that marine or common Salt, is the only Salt with which the Indian Alkali is mixed, at leaſt in any ſenſible quantity.

From the experiments of Bergman and other modern Chymiſts, it is aſcertained, that the quantity of acid contained in a hundred parts of Luna Cornea, and Plumbum Corneum, is very nearly equal to the acid contained in fifty parts of common Salt; and thence it may be inferred, that the one hundred and eighty grains

grains of the two precipitates formed in this experiment, indicated the preſence of about ninety grains of common Salt in a troy ounce of Indian Alkali, or about eighteen and ſeven tenths of common Salt, in one hundred parts of the Alkali, which proportion is only about one eighteenth part different from the proportion deduced from the third experiment.

From the above experiments, it appears that one hundred parts of the Indian Alkali, conſiſts of fifty-eight parts, eight tenths of dry mild mineral Alkali, twenty-four parts of water, and ſeventeen parts two tenths of common Salt.

It appears alſo the Alkali contained in this Indian Salt, is in a ſtate intermediate, between that of Cryſtals, which hold a large portion of water, and that of Alkali dried as much as it can be.

It may be further proper to obſerve, that this Alkali muſt, from the circumſtance of its retaining ſome part of the water of cryſtalization, be very uncertain in its ſtrength, which will vary, according as it is more or leſs dry; and the degree of dryneſs will depend not only on the circumſtances of its preparation, but alſo on the warmth and dryneſs of the weather, and on the quantity of its ſurface that is expoſed to air; ſo that the ſame parcel will be found to vary, ſometimes conſiderably, when tried at different times.

If it be required to form a compariſon between the ſtrength of this, and ſome well known Alkali, it will be found not to differ greatly in ſtrength from Hungarian Pearl Aſh; to the average ſtrength of which however, it is rather inferior, in the proportion of five or ſix per cent.

However,

However, it is to be underſtood, when I ſpeak of the ſtrength of theſe Alkali's, that it refers only to their power of ſaturating acids, not to their quantities; for it is well known that the mineral Alkali, ſaturates much more acid than an equal quantity of an equally pure vegetable Alkali; nor to their effects in arts, which poſſibly may not be in exact proportion to the power of ſaturating acids.

Having thus aſcertained the quality, ſtrength, and degree of purity of the Indian Alkali, the gentlemen of the Society who are converſant in thoſe arts eſpecially, in which Alkali's are employed, will be enabled to form their opinion reſpecting the application of this commodity to the different manufactures; I ſhall therefore only ſubmit one or two remarks to their conſideration.

No

No commodity is at preſent brought to market ſimilar to this Indian Salt, either in appearance or in quality, as a refined mineral Alkali; and this circumſtance will for ſome time at leaſt, impede the introduction of it into uſe, from the ſingular averſion which Manufacturers have to trying unknown articles, an averſion not altogether ill founded, for they run ſome hazard of ſpoiling their goods when they uſe a material, with the ſtrength of which and its peculiar mode of treatment they are unacquainted; time, however, and perſeverance will overcome this difficulty.

In conſidering its utility in making Glaſs, it will be proper to diſtinguiſh the different branches of this manufacture. For Broad Glaſs, Crown Glaſs and Bottles, it will ſcarcely come into conſideration, as a ſubſtitute for Kelp and Barilla, becauſe

becauſe it is too valuable for theſe purpoſes, and becauſe the earthy part of the Kelp and Barilla contribute, as well as the Saline or Alkaline, to the Vitrification.

In PLATE GLASS, where the Manufacturers have been uſed to employ the Salt extracted from Barilla by lixiviation, there ſeems to be a great probability of its utility; concerning which, the Manufacturers in that branch will be able to give an opinion, when they are informed, that this Indian Alkali, is a Salt of the ſame kind as that which is extracted from Barilla, and is well refined.

In FLINT GLASS, it has never been aſcertained, whether the Mineral Alkali, is as fit as the Vegetable, which is now ſolely employed. A very intelligent Manufacturer, (Mr Honeybourne) told me, about two years ago, that he had

made a trial, in making Flint Glaſs, of ſome Mineral Alkali, which was brought from India at that time, and was offered for ſale at a low price, but that it ſeemed to injure the colour of the Glaſs. He gave me a ſample of the Alkali, which I found to be very ſimilar to that ſent to me by you, but ſomewhat ſtronger. From my own former experiments in making Glaſs, I can eaſily conceive that the quantity of common Salt contained in this Indian Alkali, muſt injure the colour of Flint Glaſs, which is very delicate and eaſily affected.

The Mineral Alkali, is known to be the fitteſt for HARD SOAP; and I therefore can ſee no reaſon to doubt of the utility of the Indian Salt in this manufacture, if the price does not prevent.

For SOFT SOAP, Mineral Alkali is known to be quite unfit.

I have alſo examined the ſample of ROUGH UNREFINED ALKALI, and I find that it conſiſts of a ſaline matter, and of a quantity of rediſh ferruginous clay, equal to about eight per cent in weight of the whole maſs, upon an average of the three parcels which I tried. This clay gives a colour to the ſolution of the ſaline part in water, renders the filtration of this ſolution difficult, impedes in ſome meaſure the cryſtalization; and conſequently the extraction and refining of the Salt, are rendered thereby ſomewhat tedious, for part of the clay ſeems to diſſolve in the ſolution, or at leaſt paſſes through the filter, and forms ſome kind of union with the ſaline cryſtals, the ſhape and appearance of ſome of which are thereby altered. The ſaline matter, when ſeparated from the clay, is a mild mineral Alkali mixed with common Salt, and does not differ in any

reſpect from the refined Alkali. The rough Alkali contains a larger portion of water than the refined. Its ſtrength or quantity of Alkali contained in it, is to the ſtrength or quantity of Alkali contained in the refined ſample, as ſeventy-ſix to one hundred.

It is needleſs to obſerve, that this mixture of clay, muſt in ſome degree injure the Alkali, with reſpect to its utility in moſt of the arts, to which Alkalies are applicable; and I ſhall add, that the refined Alkali, ſeems to me to be ſufficiently pure for every purpoſe of arts, excepting perhaps thoſe few inſtances, where the common Salt may be injurious. In all other reſpects, this Alkali is clean and well refined.

I am with much reſpect and eſteem,

Dear Sir,

Your moſt obedient humble ſervant,

JAMES KEIR.

DR JOHNSON.

Good-

Goodman's Yard, January 9, 1787.

JESSE RUSSELL preſents his compliments to DR JOHNSON, and in anſwer to his, the Indian Foſſil Alkali is as under.

Refined Native Foſſil Alkali	9
Rough Native ditto	7
Rough ditto from the Cheſt	7
Ruſſia Pearl Aſh	9
Good Barilla	7
Rough Pot Eſſex Aſhes the very beſt	5½

The average price of Barilla, for the laſt three years, is twenty-ſeven pounds ten ſhillings.

The average price of Pearl Aſhes, thirty-two pounds.

Mr FALSHAW's reſpectful compliments to DR JOHNSON, informs him he has tried the Indian foſſil Alkali, and made Rochell Salt with it. It anſwered ſo well in the operation, that I eſteem it more profitable than Barilla, by one twentieth; and more ſo than the beſt Pearl Aſh, by eight per cent.

Other experiments I have not had leiſure to make.

Old Fiſh Street,
January 18, 1787.

PAPER

PAPER

IN

POLITE ARTS.

POLITE ARTS.

THE procuring accurate Surveys to be made of the Counties of England and Wales, has ever been conſidered a proper ſubject of attention by the Society; and in conſequence of ſeveral rewards beſtowed, many Maps of the different Parts of the Kingdom have been obtained; Copies of which are reſerved in the Society's Collection.

This year the GOLD MEDAL was voted to Mr WILLIAM YATES of Liverpool, for his Map of Lancaſhire; the following Letters and Certificates having been received, by which it appears that this Survey is accurately delineated.

Cuſtom

Cuſtom Houſe, Liverpool.
March 12, 1787.

SIR,

I Am informed that the Society for the Encouragement of Arts, Manufactures and Commerce, have formerly granted premiums for the Surveys of Counties, and ſtill continue to give marks of their approbation to ſuch as are executed with preciſion and accuracy.

I have deſired Mr FADEN to wait upon you with Proof Impreſſions of my Survey of the extenſive and populous county of Lancaſter; upon which I have been employed for a number of years, and flatter myſelf that it will meet with the approbation of the Preſident and Members of your Society, to whom I beg permiſſion

miſſion to requeſt you will be pleaſed to preſent it.

It has been executed wholly at my own expenſe, without any previous aſſiſtance from ſubſcriptions, and with an attention that has been honoured with the approbation of many gentlemen of the firſt character in the County; to whoſe inſpection it has already been ſubmitted, and who have been pleaſed to atteſt ſuch apbrobation by their ſignatures to the annexed Certificate.

Some favourable notice of it by the Society, would greatly tend to introduce it to more general knowledge in the Kingdom, and confer a laſting obligation upon

Sir,

Your obedient humble ſervant,

WILLIAM YATES.

Mr MORE.

We

We whoſe names are underwritten being inhabitants of the county of Lancaſter, do hereby certify, that we have examined the ſurvey of the ſaid county made by Mr WILLIAM YATES; and do find the ſeveral parts within our knowledge, to be a true ſurvey, and moſt accurately delineated.

Dur. Raſbotham	Bamber Gaſcoyne
Roger Deerhurſt	Nicholas Aſhton
James Hilton	John Atherton
Thomas Sunderland	R. W. Walton
Edward Standiſh	Robert Moſs
Alexander Butler	William Gregſon
R. Fletcher	Thomas B. Bayley
Miles North	Joſeph Pickford
James France	Richard Townley

Richard Wilbraham Bootle.

PAPERS

PAPERS

IN

MANUFACTURES.

MANUFACTURES.

SEVERAL years ſince, the Society received from one of their Correſponding Members, Dr JACOB CHRISTIAN SCHAFFERS of Regenſburg, two Volumes, containing a great variety of Specimens of Paper, manufactured from RAW VEGETABLES: As ſeveral of theſe Papers ſeemed of a good quality, it appeared to be well deſerving the attention of the Society, to have a fair trial made of ſome of the refuſe vegetable matters, that have hitherto been conſidered as of very little value, in order to know, whether they could, or could not, be advantageouſly introduced

duced into the manufacture of Paper; an article, of which the conſumption, and conſequently the price, is every day encreaſing. On this account, in the year 1787, a premium of TEN GUINEAS was offered "To the Perſon "who ſhould make the greateſt quan- "tity, not leſs than ten reams, of the "beſt and moſt uſeful Paper from ve- "getable ſubſtances not previouſly "made into Cloth."

It rarely happens that any Manufacturer is ſo ſoon induced to try experiments on ſubjects with which he is unacquainted, as it appears by the following Letters Mr GREAVES has been on this mode of making Paper; and although from not having manufactured the quantity required by the advertiſement, he could not be conſidered as entitled to the Premium offered, the Society

Society therefore " Reſolved that not-
" withſtanding the Paper ſent in, does
" not in all reſpects equal their deſires
" (which in ſo new a work, is not at
" all ſurpriſing) yet from eight quires
" of the Paper, the produce of one of
" the experiments, it ſeems likely to
" anſwer ſome valuable purpoſes here-
" after, when the mode of working
" raw vegetable materials, ſhall be
" better underſtood :" And in conſe-
quence of the attempt made by the Candidate to forward the views of the Society, by manufacturing ſo uſeful an article as Paper from refuſe materials not hitherto applied to that purpoſe in this Country, the Society voted to Mr GREAVES their SILVER MEDAL, from whom the following Letters and Samples of the Paper were received, which ſamples are reſerved in the Society's Collection for the inſpection of the Publick.

Mill Bank, near Warrington,
Auguſt 10, 1787.

SIR,

YOU will remember that when you was here the laſt ſummer with Mr WILKINSON, you was deſirous that I ſhould attempt making of Paper from the Bark of Withins.

In conſequence whereof I have made the trial, and now ſend you by Mr Widder's waggon from Warrington, one ream of ſuch Paper, which is made rather ſtouter than I wiſhed, but that I could not readily avoid, from the tenderneſs of the material, when ground in the Engine. I ſend therewith, ſamples of the material, and how it was prepared.

In the lower part of the bundle, you will find twenty-four half quires. In the upper

upper part of the bundle, are eight quires ſomething finer, made from the Bark only, prepared and broke down in the ſtate you will find it, wrapt up in another part of the bundle.

I ſhall be glad to hear how you approve this article, which has been attended with a good deal of trouble, loſs of time and expenſe; and indeed more than I expected, but that generally happens in any new undertaking.

I preſume you will receive the parcel in about ten days;

And am, Sir,

Your moſt obedient Servant,

THOMAS GREAVES.

Mr More.

Mill Bank, near Warrington,
Decr 22, 1787.

SIR,

I Received your two Letters, which ſhould have been ſooner replied to, had I not been much from home and particularly engaged. The proceſs uſed in making the Paper ſent you from the Bark or Peel of Within Twigs, was to have it ſtript from the twig in the month of September, when the twigs are uſually cut for the making of white baſkets. I then provided about ſix hundred weight, of which I ordered about two thirds to be hackled, much in the manner of dreſſing Flax or Hemp; then dried it in the ſun, which gave it ſomething of the appearance of brown Hemp. In this ſtate it was reduced to about one hundred weight, but being attended with a good deal of trouble and ſo much reduced, I dried

dried the remaining two hundred weight, with the leaves in its green ſtate as it was ſtript from the twig, and that was reduced about one half.

Having prepared the ſtuff, cheſt and vatt, quite clean, I chopt the clean bark or firſt preparation, and with the roller and plate quite dull and ſmooth as poſſible, I ſet the engine to work, and from it was produced the Paper of which you had eight quires ſent, being the finer ſort; and from the other was produced the coarſer Paper, of which you had the twenty-four half quires. From theſe materials I made little more than two reams, in the whole; but had I not hackled and cleaned the larger part, I expect that I could have made upwards of ten reams from them.

Nothing was uſed but the mere bark or peel of the twigs, without any Oak-

um, Hemp, or other preparation. And as I conſidered that the experiment you wiſhed, would then be made, I was not mindful of the quantity being more: But the next ſeaſon, if it be deſired, I can readily make any additional quantity, though at what price it may be ſold, or to what uſe it may be beſt applicable, I cannot ſay, but I think it may be made at about one half the expenſe of other Paper that is produced from ropes or rags, when it is made from the bark and leaves in a green ſtate, without being dried, which I ſhould recommend and conceive it will anſwer beſt.

If I can give any further information, or make any other trial that may be likely to be productive of good, I ſhall be very glad to do it, and ſhall hope to hear from you. I am, Sir,

Your moſt humble ſervant,

THOMAS GREAVES.

Mr MORE.

PAPER FOR COPPER PLATES.

THE manufacturing, in England or Wales, Paper equally fit for receiving impreſſions of Engraved Copper Plates, with that imported from France, was conſidered by the Society ſoon after their inſtitution, as a proper ſubject for their encouragement: And the great improvements in the art of Engraving that have within theſe few years been made in this Kingdom, by which the exportation of Prints to foreign Countries, is become an extenſive article of Commerce, renders the obtaining ſuch Paper at this time, a very deſirable circumſtance. The Publick therefore will be well pleaſed to find, that in conſequence of the Premiums beſtowed by this Society, the making of a proper Paper is perfected by Engliſh Manufacturers.

In the Vth Volume of theſe Tranſactions, Page 231, it appears that in the year 1786, the Silver Medal was voted to Mr Lepard, as an approbation of his attempt to accompliſh the intention of the Society, in offering a Premium for making, in England or Wales, Paper for taking impreſſions from engraved Copper Plates equal to the Paper imported from France. The ſame Premium being continued in the year 1787, two Candidates appeared, and the Gold Medal was adjudged to Mr John Bates of Wickham Marſh, Buckinghamſhire, in conſequence of a due examination of the impreſſions taken on the Paper, and compared with the French, and the following opinions received from the Copper Plate Printer and Artiſt, who had been applied to on the occaſion.

LETTER

LETTER from Mr HADRILL, Copper Plate Printer, No. 11, George Street, Portman Square; dated March 26, 1787.

GENTLEMEN,

I Have made trial of the different ſpecimens of Paper received from the Society, and find upon the niceſt obſervation, that which is marked with five holes, is by far the beſt; I wetted it againſt the French Paper, and found it takes the water equally well, and will keep much longer before it mildews, and is much ſuperior to the French in cleanneſs: in this there are no Iron Moulds, which are very common in the French, and a very great defect. With reſpect to taking the impreſſion, the different Prints taken on each,

each, will ſhew by compariſon, that they appear very little, if any, inferior to the French.

I am, Gentlemen,

Your moſt humble ſervant,

PETER HADRILL.

To the Committee of
Manufactures, Adelphi.

EXTRACT of a LETTER from Mr. WEBBER to Mr. HADRILL; dated Oxford Street, No 312. March 27, 1787.

MR WEBBER informs Mr HADRILL, that he conſiders the Paper that has five holes on the margin, to be much the beſt for printing, as it is of a ſofter texture than the other, and the impreſſions are in every reſpect ſuperior. He would not have any objection to have that Paper made uſe of for ſome of his works in future.

CUL-

CULTURE OF SILK.

THE Thanks of the Society were given to PETER NOUAILLE of Greatneſs, Kent, Eſq; for the following obſervations on the Culture of SILK in England, which were communicated in conſequence of a Letter and Sample of ſome Silk produced by a Lady, who having bred ſome Silk Worms and SPUN the Silk from the Coccoons on a ſmall Wheel inſtead of WINDING it on a Reel, as is the uſual method, produced a ſample to the Society; for which, Thanks were alſo returned to her, and as the paper written by Mr NOUAILLE will fully inform thoſe perſons who may hereafter purſue the breeding and rearing Silk Worms in this Country, by what means the Silk may be reeled to the beſt advantage; it is with the permiſſion of the Author ſubmitted to the conſideration of the Publick.

DEAR

DEAR SIR,

THE idea of condemning, under my hand, the very laudable endeavours of an ingenious Lady, made me rather wiſh to ſatisfy your deſire of knowing my opinion of the merit of her propoſal, by a ſhort converſation with you on the ſubject; which I had reaſon to conclude would not have taken up more than five minutes of your valuable time: but when I called in the Adelphi this morning, with that intention, unfortunately you were not at home; I am now therefore reduced to the neceſſity of thus giving you a part of my thoughts on the ſubject of ſpinning and reeling of Silk in general, in the moſt conciſe manner I am able, by explaining to you ſo much of the proceſs, now univerſally in uſe in the principal Countries of its produce, as will enable you fully

to

to determine and decide for yourſelf, in moſt of the general caſes, in which thro' your medium, the Society may be applied to for their benevolent exertions, in ſo laudable a purſuit, by obſerving to you, that all the Ladies, who, to their great merit be it ſpoken, have hitherto exerted their ingenuity and their patience, in endeavouring to introduce the growth of Silk into this Country, have ſome how or other, been one and all very injudiciouſly adviſed to ſet out with making a courſe ordinary kind of Silk, of but little value, compared to what the Silk Worm is capable of under judicious management, at a very little more expenſe; what I mean to allude to in particular is, that all the ſpecimens I have occaſionally ſeen with you, or have read an account of in the Tranſactions of the Society, have been compoſed of eighteen to twenty Cocoons, the value of which, ſuppoſing it comparatively

ratively and intrinſically eſtimated, would not be equal to twenty ſhillings per pound of ſixteen ounces; whilſt a pound of Silk compoſed of the very ſame materials, conſiſting of only ſix or eight Cocoons, would at the leaſt value, be worth nearer thirty ſhillings per pound: and if of four of five Cocoons only, it might then vie with the moſt ſuperlative produce of Italy; and be in all reſpects, if executed with equal attention, of equal value to that for which no leſs than forty ſhillings is now demanded: From whence, probably you may be lead to conclude, that the coſt of labour or workmanſhip, might in ſome degree counterbalance the difference of their reſpective value. How far that really is or is not the caſe, you will be better enabled to form your own judgment by my ſtating to you the fact, which is, that a woman at Novi, experienced in the buſineſs of ſpinning, with the aſ-

ſiſtance

ſiſtance of a Girl to turn her Reel, and attend the fire under the Cauldron, can with eaſe, reel off one pound of Silk, conſiſting of four or five Cocoons of the moſt perfect quality, in the courſe of a day; in order to do which, with all the attention that is required, ſhe is never permitted to have more than two ſkains going upon her Reel at one time, which being compleated by noon, are ſet by to dry in the ſhade upon the Reel. Other two, upon a freſh Reel; are compleated by her in the afternoon, and ſet by to dry as the former, and are taken off the Reels the firſt thing in the morning of the ſucceeding day; when each woman's day's work, conſiſting of four ſkains, is made up in a bundle, with her name affixed to it upon a ticket, the better to aſcertain and detect any fraud or inattention ſhe may have been guilty of in its execution.

But

But when a more ordinary quality is the object, in which a greater number of Cocoons are to be united; ſhe is then permitted to have four, ſix or more ſkains going at one time, and that upon Reels of much larger dimenſions: the conſequence of which is, that her attention to each, individually, cannot be equal to the accuracy required, when ſhe is limitted to two ſkains only: ſhe now produces a courſe, foul, ordinary, uneven Silk; a day's work of which, will be equal to ſix, eight or more pounds.

Now to form a judgment of the effects of the different ſort of labour, as it affects the two different methods of operation; ſay a woman employed in ſpinning, with a girl to attend upon her, earn together much about one ſhilling per day, which in the firſt inſtance is the whole coſt of labour, to produce one pound of perfect Silk;

Silk; while in the other, eight pounds of Silk are obtained for the ſame expenſe; upon which, evidently the per poundage, amounts to no more than three halfpence, a difference of ten pence halfpenny per pound coſt of labour, in favour of the ordinary Silk; while the intrinſic value in favour of the former, falls little ſhort, ſpeaking much within compaſs, of fifteen ſhillings per pound.

Thus far, if I have ſucceeded ſo as to be generally underſtood, I hope my endeavours may have a tendency to be occaſionally of uſe to the Society, or at leaſt to you, in whatever future applications may be made to them, through your medium, on the ſubject. And now, to give you my candid opinion of the experiment, made and propoſed by a lady on the Spinning Wheel, which will hardly admit of a ſerious diſcuſſion: You undoubtedly

do, or may eaſily know, the dimenſions of the Italian Reel, of which the Society have a Model in their Collection, on the ſame ſcale as thoſe uſed abroad.

Firſt, conſider with yourſelf that Reel, which is not leſs than ſix feet eight inches circumference, ſet in motion, with a velocity at leaſt equal to the ſwifteſt going Fly of a common roaſting Jack. Then compare the dimenſions of a Bobbin, and the greateſt velocity with which it poſſibly can make its revolutions, at the Spinning Wheel, and you will not be long in pronouncing, upon good authority, that the Reel may fairly be computed to take up more than five hundred yards, in the time it would require to execute one yard by means of the Spinning Wheel, which will at once determine the incligibility of the latter, even were it capable, as it is not, of contributing ever ſo

ſo much to the perfecting the ſtaple of the Silk, by conſolidating its filaments, which from the manner in which the operation is uſually conducted, requires no ſuch aid or aſſiſtance; conſequently, the Spinning Wheel, being incapable of meliorating the quality of the Silk, the tedioufneſs of the operation is alone ſufficient to point out its inefficacy.

I am, dear Sir,

Your moſt faithful humble ſervant,

PETER NOUAILLE.

London, March 25, 1788.

Mr MORE.

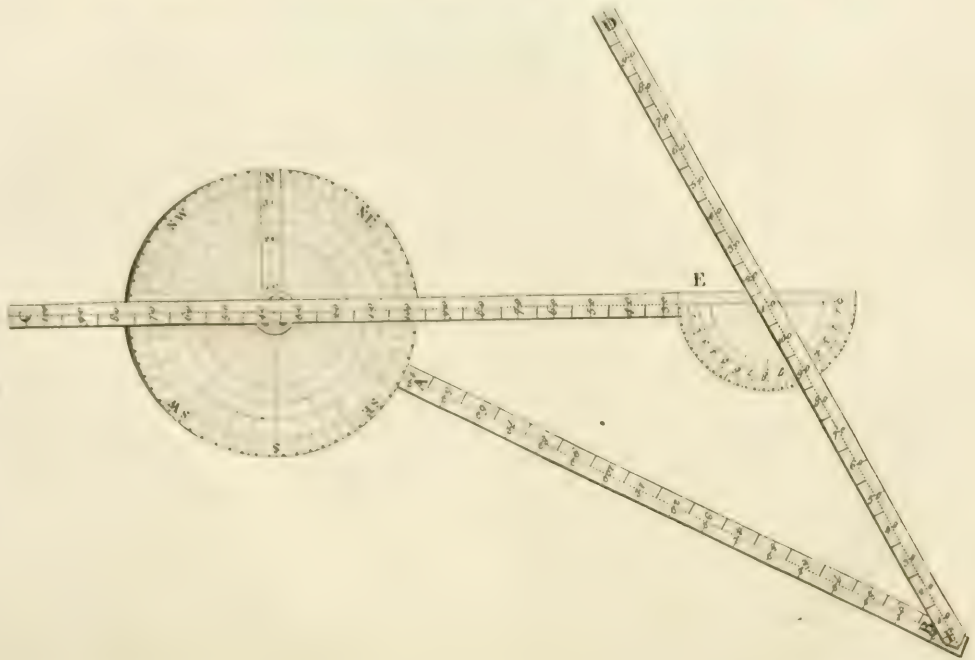
PAPERS

IN

MECHANICKS.

Plate I.

W. Mathew. Hills. Machine for measuring Angles.



MECHANICKS.

A Bounty of FIVE GUINEAS was voted to Mr MATTHEW HILL of Scarborough, for his invention of a Machine for meaſuring Angles, of which the following Letter contains a Deſcription, with References to the annexed Plate. The Machine being reſerved in the Society's Repoſitory for the inſpection of the Publick.

SIR,

YOU will herewith receive a Triangular Model, and a Diagram of it; being an Apparatus which I truſt will be found uſeful in ſolving trigonometrical

queſtions; and I hope will prove not unworthy the notice and adoption of the Mathematical Inſtrument Maker, for the uſe of Schools and ordinary Seamen, in ſolving queſtions in Navigation.

A demonſtration of the uſe of the Triangle, applied in plain ſailing; Suppoſe either from a Book or Chart, the courſe and diſtance are known, but the wind not anſwering to ſail upon that point, yet keeping as near to it as I am permitted, after having run ſome time on my courſe, I am deſirous to know my direct courſe and diſtance to the Port, they may immediately be had from the Triangle, by ſetting the fixt leg A B, plate 1. to point out the given courſe and diſtance; and C E, the courſe and diſtance ſailed: then ſetting the diameter of the braſs ſemicircle paralel to the courſe ſailed, its index will ſhew how many points the courſe to the Port,

Port, differs from the courſe ſailed. When F D, is fixt with its pin in the diſtance of the deſired Port, then alſo is ſhewn the courſe and diſtance thereto.

Firſt inſtance. From Flamborough Head to the Texel is, in Diſton's Seaman's Guide, S E by E. one hundred and ſeventy-ſix miles; ſuppoſe the courſe made good, to be E, one hundred miles: Having ſet the diameter of the ſemicircle parallel to C E, then will F D, when extended to the intended Port, cut two and one quarter points for the courſe, and one hundred and eight miles the diſtance. Hence the uſe of the plain Triangle evidently appears in all caſes of plain and oblique ſailing; conſequently better than the ſinecal Quadrant, being as applicable to right angled caſes as that is.

Second

Second Inſtance. The difference of latitude and departure for a N N E courſe, one hundred miles diſtance being required; ſet A B, to the north, E C, with diſtance ſailed to the N N E, then D F, ſet to cut A B, at right angles, ſolves the queſtion; that is, on A B, is the difference of latitude, and departure on D F.

TWENTY GUINEAS were voted to Mr JOSEPH RIDLEY for his improved SECTOR and TOOL for ſetting Wheels and Pinions in Watch Work, &c. of which a particular Deſcription is hereafter given, with Plates of the Inſtruments, and for the further information of Artiſts, to whoſe uſes ſuch Tools are particularly adapted. The Inſtruments themſelves are reſerved in the Society's Collection, for the inſpection of the Publick.

DES-

DESCRIPTION

OF THE

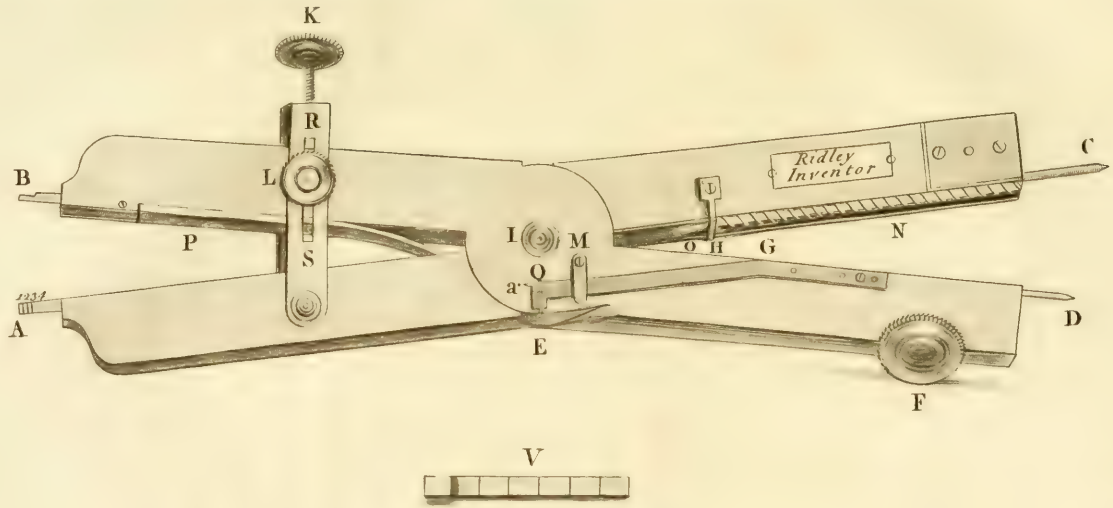
SECTOR DEPTHENING TOOL

For Wheels and Pinions of Watches, &c. invented by Mr Joseph Ridley.

See Plate 2.

A B and D, are at exact diſtances from the joint or center Pin I.—A and B are fixed, and the outſides of them are to be applied to the inſide of the legs of the Sector, to take the ſemidiameter of Wheels and Pinions when added together. D, is a point moving on a center G,

Plate II.



Mr. Ridley's Sector & Depthening Tool.

TORONTO ATHENÆUM
INSTITUTED 1843

G, and puſhed in or out by the micrometer Screw F; and the tooth E, being at an equal diſtance from the point D, when the point Q comes to the dot a D, C, and A, B, ſtand at equal diſtances from each other. By winding up the micrometer ſcrew F, the point D, bears in; and the tooth E, is thrown out as far as the workman would have the Pinion take into the Wheel: then by putting the tooth of the Wheel againſt the Braſs, under the tooth E, the depth may be ſetas is thought proper. C, a cylinder, with a point at the extremity, that pumps up through a hole in H, directing to the center I, being a direct line from the point of the cylinder C, acroſs the center pin I, to the outer part of A. When the inſtrument is uſed, it muſt be held in ſuch manner, that the point A, is perpendicular to the point C. H, a piece of ſteel fixed on the braſs leg, with a hole through

through it to direct the end of the cylinder C, to the center pin I. N, a Wormſpring on the cylinder C, within the braſs leg. At O, the end of the point D, is formed into a ſtrong ſpring, lying within the braſs leg, to keep D bearing againſt, and depending on the direction of the micrometer ſcrew F. E, a tooth: when a Wheel is placed under this tooth any depth, choſen, may be had by winding up the micrometer ſcrew F. Q, a point projecting from a moveable ſteel bar: when this point is exactly on the dot a, and the cylinder C pumped up, D and C, will be at the ſame diſtance from each other that A and B are. R, a Brace, that laps on each ſide the Inſtrument, to give play to the ſtrong ſpring P, which being moved by the micrometer ſcrew K, ſets the Inſtrument out or in. S, a ſlit in the Brace, to receive the ſcrew L, by which the Brace is fixed when the Inſtrument

ment is ſet to any deſired place. At A, are four marks, and it muſt be obſerved, that when the outſide of A and B, which go between the legs of the Sector, expand one quarter of an inch, you muſt riſe A, as far as one mark above the ſurface of the Sector; but the end B, muſt at all times come even with the ſurface of the Sector. When they expand two quarters of an inch from each other, then you muſt riſe A, two marks, &c.—V, a ſmall Braſs Rule an inch and an half long, divided into quarters of an inch: by ſetting this Rule to A, the diſtance from A to B, in quarters of an inch is ſhewn; and as many quarters of an inch, as appear, ſo many marks muſt be ſeen above the ſurface of the Sector.

DIREC-

DIRECTIONS FOR USING THE ABOVE INSTRUMENT.

WHEN it is required to find holes for Wheels and Pinions, put the Wheel to its number on the Sector, Plate 3. then try the Pinion; if found to agree for what they are to perform, add the diameter of the Pinion to the number of the Wheel, from which take the ſemidiameter of the two; for example, If the Wheel is 80, and the Pinion 8, added together=88; the half is 44. Then bring the Points A B, of the depthening Tool, plate 2, to 44, between the legs of the Sector; ſcrew up the micrometer ſcrew F, Plate 2, which throws out the tooth E, as far as you would have the Pinion take

take in the Wheel; at the ſame time incline the point D, as far in as the tooth E, is thrown out; then put the point of the cylinder C, into the hole you are to go from. Pump up the cylinder C, to bring the point D, down, to mark the place where the next hole is to be drilled, and holding A, perpendicular to C, make the mark, and drill it carefully; for ſhould you be ever ſo accurate in ſetting the Inſtrument, you may by drilling the holes improperly, utterly defeat the intention.

INSTRUCTIONS FOR MAKING WHEELS AND PINIONS FOR ANY TWO GIVEN HOLES.

Firſt, let out the tooth E, Plate 2, a proper depth; the moſt certain way is to take a Wheel, having as near as you can imagine, ſuch Teeth as your Wheel will have when cut; then put the point of the

cylinder C, into one of the holes you are providing Wheels, &c. for; pump it up: when the point D, comes down, wind the micrometer ſcrew K, in the brace, in or out as required: when the point D, comes to the center of the hole, apply the ends of the inſtrument A and B, between the legs of the Sector, at half the number of teeth you propoſe to have in your Wheel and Pinion, when added together; for example; if the Wheel be 80, the Pinion 8, together 88: half is 44; bring your Sector carefully together, ſetting A and B, Plate 2. at 44; make faſt your Sector, and make your Wheel to fit at 80, and your Pinion at 8: When they are cut, put them in the given holes, and you will find your Pinion will depthen as far in the tooth of the Wheel as you have let out the tooth E, beyond the edge of the braſs. The Pinion, when a Leader, meaſures its full

full number; but when the Wheel is Leader, it muſt be obſerved, the Pinion is not to take its full diameter, but only at $7\frac{1}{2}$ at moſt, and 7, at the leaſt; the Pinion therefore is not to be taken by its number, but by its diameter; for inſtance, if a Wheel has 80 teeth, and the Pinion 8, being led by the Wheel, and the diameter according to the Wheel, be but 7: add 80 and 7 together, the half of which is $43\frac{1}{2}$. After this manner all allowances muſt be made. In fancy work there are many methods of gauging and cutting Wheels and Pinions; but it muſt be obſerved, that from the diameter when added together, you are to take the ſemi-diameters.

This is a true deſcription of, and direction for the uſe of my new invented Sector Depthening Tool.

JOSEPH RIDLEY.

April 14, 1788.

DESCRIPTION

OF THE

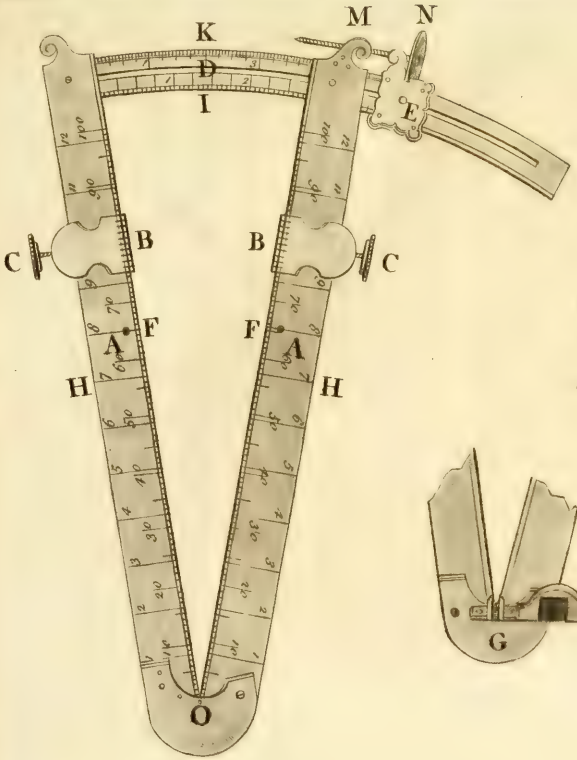
SECTOR

As improved by Mr Joseph Ridley.

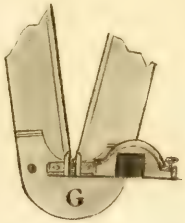
Plate 3.

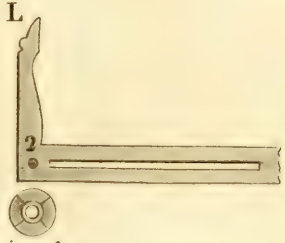
THE ſide of this Sector having the two ſcales on the arch, bears it's true meaſure from the center pin O, and is uſeful for taking the diametrical part or parts, from ſix inches to the niceſt point. In order to take the diameter of a ſphere or any part of a cone, there are employed two angles of braſs L L, having each holes in the angles 1, 2. with ſlits in the long parts; theſe are parallel when in uſe, but are only put on occaſionally, and do not remain

M.r Ridley's improved Sector.

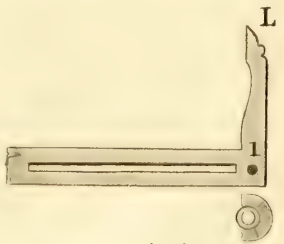


The Screw to go in the hole of one, & the slit of the other, & screws in the 60. & 70. on the scale **F.** *on the Sector, not on the wheel & pinion side but is guided by the lower Scale, never to be on but when required for Spheres &c.*





Spring Screws



Spring Screws

remain on the Sector. The ſpring ſcrew is cut away to receive the ſcrew for hole 1, that works in hole 2. When you fix on the angles, put the ſcrew above mentioned, No 1, in the double angle near the hole; and through the ſlit of the other, ſcrew it in the hole provided between 60 and 70, on the ſcale F in the leg that the micrometer works in: put the other ſcrew in the ſlit of No 1, and through the hole of No 2, into the hole in the other leg between the 60 and 70 in F, being juſt eight inches from the center pin O, pointing from the ſcale H H; the perpendicular parts L L, ſtand up towards the arch. And by the under ſcale I, on the arch D, being figured into quarters of inches, you may find the true diameter of a ſphere or any part of a cone, &c. A A, are the legs of the Sector. BB, the ſliders, bearing ten holes each, and moving up and down to any part

of the legs to take any diameter required, with dividers, the holes being directly over the inner edge of the Sector. C, C, the nuts and ſcrews to keep the ſliders cloſe to the edge of the Sector when ſet to any deſired place. D, the arch bearing two ſcales, the upper, marked K, the under, marked I. E, the follower, when ſet faſt by its ſcrew, the micrometer N, working through M, winds one of the legs of the Sector in or out in order to ſet it to any nice point. F F, are ſcales of one hundred eighths of an inch, to make the taking diameters of Wheels more eaſy. H H, are ſcales of twelve inches, directing to and dividing the inner ſcales F F, into inches. I, the under ſcale on the arch D. for the two angles of braſs L L, when occaſion requires them. K, the upper ſcale on the ſame arch ſhewing the diſtance the legs of the Sector ſtand at the twelfth inch from the center

ter pin at all times. By this ſcale you may find diameters with great accuracy. If what you take the diameter or the length of, comes within an inch and an half by the ſcale K, then the twelve inches ſtand at an inch and an half diſtance, being 12 eighths; each inch from the center, being one eighth; and each eighth on the ſcale F, being divided into half, divides each eighth into ſixteen diſtinct parts. By the ſcale K, the Sector may be ſet to take diameters, lengths, ſquares, &c. from the ſmalleſt point to ſix inches, being the number of inches on the ſcale K.

DESCRIPTION OF THE WHEEL AND PINION SIDE OF THE SECTOR.

The ſcales F F, on the inſide of the Sector, are for Wheels and Pinions only, beginning its numbers two ſpaces from

the center pin. B B, the ſliders as before mentioned. G, two ſteel chaps to guage the Cutter proper for cutting any Wheel prepared for that purpoſe. The Blank Wheel muſt be put to the number of the Sector you would have cut. To find the ſize of the Cutter, apply it in between the top of the chaps G. If you deſire to have the ſpace and tooth equal, put your Cutter juſt half way; if wider or narrower, you may judge by putting the Cutter in or out from the mark in the middle of the Chaps. In cutting ſmall Wheels, Nuts or Pinions, the Cutter muſt go in between the Chaps beyond the mark in the middle. By the cutting a Wheel about three quarters of an inch, and a Pinion of about an eighth, the workman may judge how to guage his Cutters, according to the ſize or diameter of his Wheel or Pinion.

The

The wheel and pinion ſide of the Sector, will not tell, by the ſcale, the ſemidiameter of a Wheel, for in taking diameters on the Wheel and Pinion ſide, the two loſt at the bottom muſt be carried with the number, ſo that 80, is to be called 82 from the center pin, and 8 is to be called 10; then adding 82 to 10, makes 92; the half of which is 46. When there are two diameters to be added together, this ſcale tells right, but at no other time without carrying the loſt 2 at the bottom.

This is a true deſcription of my IMPROVED SECTOR.

JOSEPH RIDLEY.

April 14, 1788.

CAR-

CARRIAGE

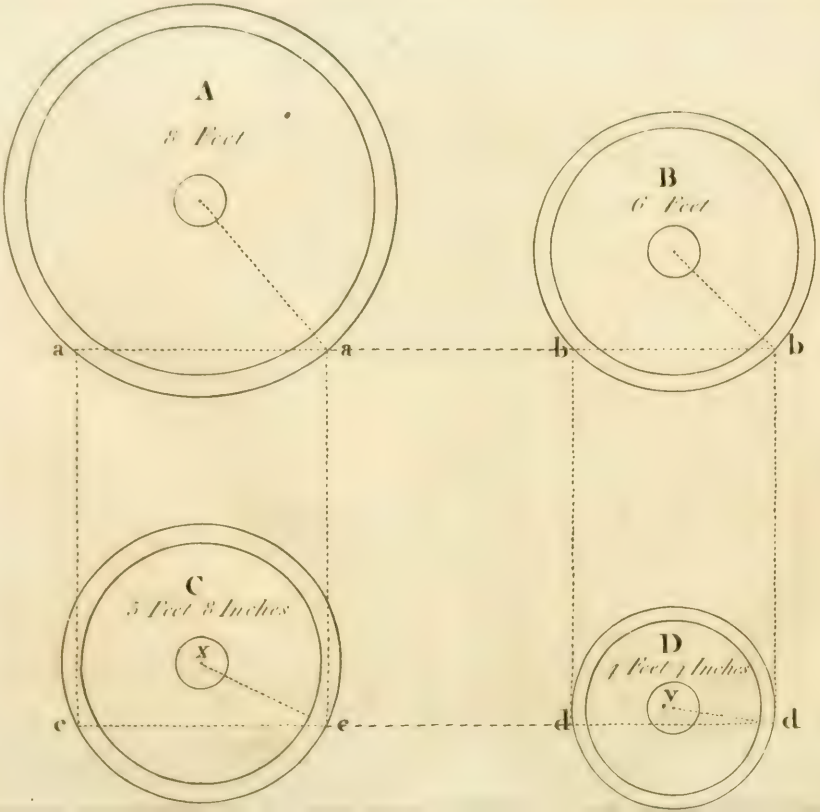
FOR CONVEYING

TIMBER, &c. OVER SOFT OR BOGGY LAND.

THE Advantages that would ariſe if a ready and commodious manner of conveying Timber or other heavy Materials, over ſoft or clayey Land, at a moderate expenſe was diſcovered, are well known to all perſons concerned in felling Timber, or tranſporting Blocks of Stone: And a premium was offered during ſeveral years, for producing to the Society, a method of accompliſhing the end propoſed. This year, a claim was made, and the premium, (TWENTY GUINEAS) adjudged to Mr JOHN BESANT of Mill Bank, Weſtminſter, of whoſe Carriage a Deſcription is annexed; and the Model produced, is reſerved in the Society's Repoſitory, for the inſpection and uſe of the Publick.

MR

Plate II



Mr. Brunel's explanation of his Circles.

Mr BESANT's Explanation of a CARRIAGE for conveying Timber or other heavy Materials over soft or boggy Land, and of the Principle on which the Model is conſtructed.

THE Model of the Carriage, (which is on a ſcale of three inches to a foot) it is believed will convey a proper idea: And the following explanation of the advantages of the high wheels, and troughs or ſlids, over common wheels, will, it is preſumed, give it a decided preference over other Carriages, not only for the above purpoſe, but for all common uſes; as this Carriage may be loaded by one man, and the expenſe of it is not ſo much as

as that of a common Carriage and the Gin which muſt accompany it; for a farmer may go into the wood, cut down two poles, lay them upon the Axis and Wheels, fix them with a chain, and with the aſſiſtance of two common ſawpit rollers, he will form a compleat Carriage.

Let A B, Plate IV. be two wheels; A 8, and B, 6 feet diameter: C and D, two wheels; C, 5 feet 8 inches: D 4 feet 4 inches, being the uſual ſize of Carriage wheels. Admit the weight of an horſe to be 600 lb. the ſuperficial contents of his hoofs, 5x5. 25 inches; it is evident that for a horſe to walk, the denſity of the ſoil on which he walks muſt be ſufficient to ſupport him on three legs 25 x 3-75 inches, by which divide 600; the quotient gives 8lb. to the inch: the denſity of the ſoil the horſe requires to ſtand on; then ſuppoſing A and B to be ſunk twelve inches

ches in the ground, the length a a, of the ſurface A, and bb of the ſurface B, will be 5 feet 5 inches, and 4 feet 9 inches= 122 inches, which x 2, for the oppoſite wheels 244; which x6 for the breadth of the felly=1464 inches for the ſurface the wheels reſt on; this x8, the denſity of the ſoil 11712lb. or 5 tons, 4cwts. 2qrs. 8lb. the weight which the wheels would ſupport without ſinking more than one foot below the ſurface, and is equal to about four load of green Oak, allowing ſixty pound to the ſquare foot.

The advantage theſe Wheels have over the common ones is evident, by inſpecting the figure A B C D, as in order to gain a ſurface of 1464 inches, the wheels C and D, muſt ſink to c c and d d, near two feet below the ſurface; by which the leverage x c and y d of the ſpokes, becomes ſo ſmall in the latter as to require a very great

great addition of force to move the Carriage forward.

Four load, or two hundred feet, is a heavy draft for ſix horſes on common roads and Carriages; but the load being ſuſpended under the axis, as ſhewn by the model, the horſes drawing by the timber inſtead of the ſhafts, gives a great advantage: the center of gravity being continually urged out of its perpendicular direction by the uniform motion of the horſes, the wheels will of courſe have a continual tendency forwards, in order to recover it.

It is preſumed that this Carriage will carry five tons and a quarter on any ground which will ſupport the horſes; where it is too ſoft for them to ſtand, it will likewiſe be too ſoft to ſupport the wheels; in that caſe, the troughs or ſlids which accom-

company the Carriage, are to be placed under the wheels, which being twenty-four inches wide conſequently increaſe the ſurface on which the load will then reſt, four times, and the preſſure being in an inverſe proportion to the ſurface, will then be reduced to two pound to the inch; and the ſoil being ſo very ſoft, the troughs or ſlids will move eaſier than a Carriage would on hard roads: the carriage may then be drawn by means of a rope paſſing over the ſhieve of a notch block, tailed to any neighbouring tree or ſtump, and horſes may be placed in any direction, or at any diſtance, as the ground will admit them to work on. The method of loading this Carriage, will likewiſe have the advantage of the common Gin, on ſoft ground, in proportion to the difference of ſurface between the four wheels and the three legs of the Gin.

As

As many inconveniencies occur at timber-carting, it may not be amiſs to mention one wherein the new method will have a great advantage: Suppoſe a Carriage is loaded and going on, the wheels ſuddenly ſink into the ſoil ſo far as for the load to hang; by the common method, there is no reſource but to get more horſes and pull it out by main ſtrength, becauſe the Gin will not hoiſt it on ſuch ſoft ground: But by the new method, it is only neceſſary to looſe the leavers and lower the timber quite to the ground, draw off the wheels and place the troughs or ſlids under them, hoiſt up the load, and go on till off the bog. By the ſame mode of reaſoning, it may be ſuggeſted perhaps, that nine inch wheels would be preferable; but it ſhould be recollected, that ſix inch ones will be lighter, and therefore better for common uſe.

DESCRIP-

Plate V

Fig. 3.

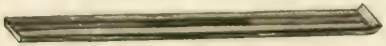
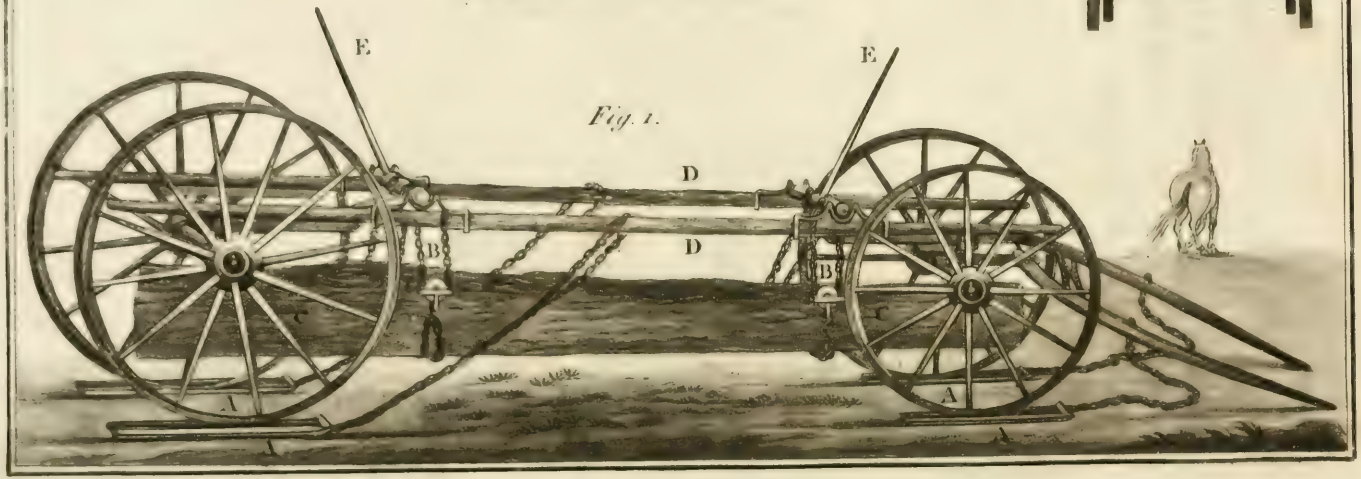


Fig. 2.

Fig. 1.



Mr. Besant's Carriage for conveying Timber on soft or boggy Land.

Description of the PLATE of Mr BESANT's MACHINE for transporting Timber, or other heavy Materials over soft or clayey Land.

A.A.A.A. Plate 5. The Troughs or Slids which are hung to the Carriage by Chains, as expreſſed in the Plate, and are occaſionally to be uſed when the ſoil is too ſoft to do without them; in ſuch caſe, the Horſe is to be taken from between the ſhafts, and placed at a diſtance, and the Carriage drawn by a rope either in a ſtraight line or paſſing over a notch-block, as mentioned in page 207. B. B. the Chains and Pullies by which the Timber or other heavy Materials CC, are ſuſpended from the Rollers which lie on the poles D D. E E, Handſpikes in the eyes or mortiſſes of the Rollers, by which the

the load is raiſed or lowered. Theſe Rollers work on Irons placed upon the Poles, and moveable thereon according to the diſtance required from the nature and length of the load. The form o theſe Irons, with the end of a Roller, is ſhewn on a larger ſcale at Fig. 2. Plate 5.

Fig. 3. one of the Troughs or Slids, detached from the Carriage.

REWARDS

REWARDS

ADJUDGED BY THE

SOCIETY,

IN

M, DCC, LXXXVII.

REWARDS

BESTOWED IN

AGRICULTURE.

TO the Rev. HENRY BATE DUDLEY, of Bradwell juxta Mare, in Eſſex, for having gained forty-five acres, one rood and twenty-five poles of Land from the Sea, the SILVER MEDAL, ſee page 56.

To the Rev. J. R. LLOYD of Aſton, in the county of Salop, for having planted ſixty-four thouſand five hundred and forty Oak Plants, on fifteen acres and three quarters of land, The GOLD MEDAL, ſee page 38.

To THOMAS WHITE, Eſq; for having planted on his Eſtate at Butsfield in the pariſh of Lancheſter, Durham, fifty thouſand Oak trees, The SILVER MEDAL, ſee page 46.

CHEMISTRY.

To HELLENUS SCOTT, Eſq; of Bombay, for having ſent to the Society, a quantity of Indian native foſſil Alkali, The SILVER MEDAL, ſee page 120.

POLITE AND LIBERAL ARTS.

Claſs 121. HONORARY PREMIUM, To Mr ROBERT MULLER, St James's Palace, The SILVER

VER MEDAL. Subject, THREE HEADS, after Piazzetti.

Claſs 122. HONORARY PREMIUM, To MISS ANN WHITEHEAD, Baſinghall Street, The GOLD MEDAL. Subject, THE HEAD SIR KENELM DIGBY, after Vandyke.

Claſs 123. HONORARY PREMIUM, To MISS CATHARINE CHARLOTTE RAPER, Cheyney Walk, Chelſea; THE SILVER MEDAL. Subject, FOUR HEADS, after Sir Joſhua Reynolds.

To MISS MARGARET ELIZA CUNLIFFE, of New Norfolk Street, THE LESSER

SILVER PALLET. Subject, FIGURES BY TORCH LIGHT, after Sir Joſhua Reynolds.

To Mr THEODORE ELLIOT, THREE GUNIEAS, for producing Two PICTURES OF SHIPPING.

To Mr HORWELL, New Store Street, THE GREATER SILVER PALLET, for a piece of Sculpture. Subject, A recumbent Figure of PSYCHE, on a Tablet, for a Chimney Piece.

Claſs 141. DRAWING OF OUTLINES, To Mr JAMES GODBY, aged 15, Berwick Street, Oxford Road; THE LESSER SILVER PALLET.

This

This Candidate not having complied with the terms of the advertiſement; the Figures in his Drawing not being of the ſize required, could not be admitted a Claimant for the Premium; but the Leſſer Silver Pallet was voted to him as a Bounty, in conſideration of the great merit of the performance.

To Mr WILLIAM YATES, of Liverpool, the GOLD MEDAL for his Survey of Lancaſhire, ſee page 153.

In the year 1784, the following Premiums were adjudged in the Claſs of Polite Arts, but omitted in the Account of Rewards beſtowed that year.

Claſs 147. HISTORICAL DRAWING,
To Mr THOMAS PROCTER,
No.

No. 144, Strand, THE GOLD PALLET. Subject, The Prophet denouncing Judgment againſt the Prieſts and the Altar of the Golden Calf, at Bethel; 1 Kings xiii. 4, 5.

Claſs 147. HISTORICAL DRAWING, To Mr JOHN HOWES, No 13, Fleet Street; THE GREATER SILVER PALLET. Subject, The Queen of Sheba viſiting Solomon.

MANUFACTURES.

Claſs 151. To Mr JOHN BATES, Wycomb Marſh, Bucks, THE GOLD MEDAL, for Paper for taking Impreſſions from Copper Plates ſee page 167.

M E-

MECHANICKS.

To Mr MATTHEW HILL, of Scarborough, FIVE GUINEAS, for his Invention of a Machine for meaſuring Angles, ſee page 183.

To Mr JOHN SMEATON, THE SILVER MEDAL, for his Deſcription and Drawing of Mr Weſtgarth's Hydraulic Machine: ſee Vol. V. page 193.

To Mr ABRAHAM DARBY THE GOLD MEDAL, for preſenting a Model of the Iron Bridge over the Severn, near Coalbrook Dale.

Claſs

Claſs 165. To Mr JOHN BESANT, Mill Bank, Weſtminſter, TWENTY GUINEAS, for a Machine for tranſporting Timber and other heavy Materials over ſoft or clayey Land, ſee page 202.

MISCELLANEOUS MATTERS.

To VALENTINE GREEN, Eſq; F. A. S. THE GOLD MEDAL, for Eminent Services.

PRE-

PRESENTS

RECEIVED BY THE

SOCIETY,

In the YEAR MDCCLXXXVII.

With the Names of the DONORS.

BOOKS.

ROYAL SOCIETY.

The Philoſophical Tranſactions for 1787, Part I, and II.

A General Index to the Philoſophical Tranſactions, from the Iſt, to the end of the LXXth Volume.

SAMUEL

SAMUEL EWER, ESQ.

Monument élevé a la Gloire de Pierre le Grand, ou relation des Travaux, et des Moyens Mechaniques, Qui ont été employés, pour tranſporter à Peterſbourg, un Rocher de trois Millions peſant, deſtiné a ſervir de Baſe a la Statue équeſtre de cet Empereur.

MONS. L. A. DAMBOURNEY.

Recueil de procedés et d' Experiences ſur les Teintures ſolides, &c. preſented by the Author.

JOHN COAKLEY LETTSOM, M. D.

Journal of a Voyage to the South Seas, in His Majeſty's ſhip Endeavour; By the late Sydney Parkinſon: with Remarks on the Preface, by Dr Fothergill, and an Appendix containing an Account of

of the Voyages of Commodore Byron, Captain Wallis, Captain Carteret, &c.

Memoirs of John Fothergill, M. D. &c. by John Coakley Lettſom; with Memoirs of William Cuming, M. D. George Cleghorn, M. D. and Peter Collinſon, F. R. and A. S.

The Works of John Fothergill, M.D. with ſome Account of his Life, By John Coakley Lettſom.

Hiſtory of the Origin of Medecine; an Oration delivered at the Anniverſary Meeting of the Medical Society of London, By John Coakley Lettſom, M. D. F. R. and A. S.

Mr WILLIAM GREEN.

New Copies and Specimens of Writing in all the Hands uſed in Great Britain; written

written in Engliſh, Latin, Greek and French; and intended for the uſe of ſchools: preſented by Mr William Green, Maſter of the Academy at Croydon.

Mr Samuel Hooper.

Seven Volumes and the Supplement, of Antiquities of England and Wales; By Francis Groſe, Eſq.

A Treatiſe on Ancient Armour and Weapons, illuſtrated by Plates; taken from the original Armour: By Francis Groſe, Eſq.

A Provincial Gloſſary; By Francis Groſe, Eſq.

A Treatiſe on an Inland Navigation from London to Norwich; By John Phillips.

The

The Hiſtory of Dover Caſtle, by the Rev. William Darell.

GEORGE STACKPOOLE, ESQ.

The Hiſtory of Wales, written originally in Britiſh, by Caradoc of Lhancarvan; to which is added, A Deſcription of Wales, by Sir John Price.

VALENTINE GREEN, ESQ.

Acta Hiſtorica Reginarum Angliæ.

MR JOHN WHITEHURST, F. R. S.

An attempt towards obtaining invariable Meaſures of Length, Capacity and Weight from the Menſuration of Time; By John Whitehurſt, F. R. S.

GEORGE WINTER, ESQ.

A New Compendious Syſtem of Huſbandry, &c. By George Winter, Eſq.

MEDICAL SOCIETY.

Memoirs of the Medical Society inſtituted at London, 1773.

TRUSTEES OF THE BRITISH MUSEUM.

Catalogus Bibliothecæ Muſei Britanici, Vol. I, and II.

ARTHUR YOUNG, ESQ. F. R S.

The VIth and VIIth Volumes of Annals of Agriculture. By Arthur Young, Eſq.

WILLIAM BEATSON, ESQ.

A Deſcription of a Net for deſtroying the Turnep Fly, &c. By William Beatſon, Eſq.

PICTURES

PICTURES, PRINTS AND MAPS.

MISS EMMA JANE GREENLAND.

Portrait of a Lady, painted by Miſs Greenland, after the ancient Greek manner: ſee Vol. V. page 103.

SIR JOHN SINCLAIR, BART.

A Sketch of a Journey made by Sir John Sinclair, in the Years 1786, and 1787.

MR. JOHN SMEATON, F.R.S.

Two Drawings and a Deſcription of Mr Weſtgarth's Hydraulic Machine: ſee Vol. V. page 179.

GEORGE STACKPOOLE, ESQ.

A Print of Sir Richard Stackpoole, formerly of Pembrokeſhire.

HENRY PELHAM, Esq.

A Map of the County of Clare.

Mr WILKINSON, Printſeller, Cornhill.

A Print of the Iron Bridge over the Severn, near Coalbrook Dale.

Mr SAMUEL MORE.

Two Prints; the one a Perſpective View: the other, a Geometrical Plan and Elevation of the Iron Bridge over the Severn, near Coalbrook Dale.

MISCELLANEOUS MATTERS.

CHRISTOPHER POTTER, Esq.

Forty-eight Mole Skins.

JOSHUA STEELE, Esq.

A Caſk of Cotton Roots.

SIR

Sir John Anstruther, Bart.

A Model of a Drill Plough, with a printed Deſcription and Plan.

Mr Abraham Darby.

A Model of the Caſt Iron Bridge over the Severn, near Coalbrook Dale.

Mr John Barton.

A Model of a Machine for ſpinning Cotton, Flax, &c.

Thomas Boothby Parkyns, Esq.

A Model of a Cabbage and Turnep Slicer.

Mr Profeſſor Ross, of Aberdeen.

A Bag of Turnep-rooted Cabbage-ſeed.

William Walcott, Esq.

A Bag of Turnep-rooted Cabbage ſeed, and ſome Seed of the Racine de Diſette.

A CATALOGUE

OF THE

MODELS AND MACHINES

Received ſince the Publication of the Fifth Volume of the Society's Tranſactions, with the Numbers, as they are arranged in the Claſs to which they belong.

AGRICULTURE. CLASS I.

LXXVI. A Model of a Drill Plough for ſowing all kind of Grain; preſented by Sir John Anſtruther, Bart.

LXXVII.

LXXVII. A Model of a Cabbage and Turnep Slicer, preſented by Thomas Boothby Parkyns, Eſq.

MANUFACTURES. CLASS III.

XXV. A Model of a Machine for ſpinning Cotton, &c. preſented by Mr John Barton.

MECHANICKS. CLASS IV.

CIX. A Model of a Machine for tranſporting Timber or other heavy Materials over ſoft or clayey Land; by Mr John Beſant, for which a premium of twenty Guineas was adjudged to him.

CX. A Model of the Iron Bridge built over the Severn, near Coalbrook Dale; preſented by Mr Abraham Darby, for which the Gold Medal was preſented to him.

CXI. A Sector and Depthening Tool for Clock and Watch-Makers, by Mr Joſeph Ridley; for which a bounty of twenty Guineas was voted to him.

CXII. A Pocket Memorandum Book for the uſe of Blind Perſons, by Mr Robert Bromley; for which the Silver Medal was preſented to him.

A LIST

A LIST

OF THE

OFFICERS OF THE SOCIETY,

And CHAIRMEN

OF THE SEVERAL

COMMITTEES.

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** ROBERT Lord Romney, LL. D. F.R.S.

VICE-PRESIDENTS.

** Charles Duke of Richmond, &c. F.R.S.

** Hugh Duke of Northumberland, K. G. F.R.S.

** George

** George Duke of Montague, K. G. F.R.S.
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P George Auguſtus Lord Heathfield, K.B.
** Honourable Charles Marſham, F.R.S.
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Sir Herbert Mackworth, Bart. F.R.S.
* James Daviſon, Eſq;
P Sir William Dolben, Bart.
* Sir Watkin Lewes, Knt.

SECRETARY.

Mr Samuel More.

ASSISTANT-SECRETARY.

Mr John Samuel.

REGISTER and temporary COLLECTOR.

Mr George Cockings.

CHAIRMEN

CHAIRMEN OF THE SEVERAL COMMITTEES.

Elected March 22, 1788.

ACCOMPTS.

James Hebert, Eſq;
Francis Stephens, Eſq; F. A. S.

CORRESPONDENCE AND PAPERS.

Valentine Green, Eſq; F. A. S.
Robert Dower, Eſq;

POLITE ARTS.

Caleb Whitefoord, Eſq;
John Pariſh, Eſq; F. A. S.

AGRICULTURE.

John Pratt, Eſq;
Rev James Cooke.

MANU-

MANUFACTURES.

Mr Charles Smith,
Mr John Baynes.

MECHANICKS.

Joſeph Hurlock, Eſq; F. R. S.
* Samuel Ewer, Eſq;

CHEMISTRY.

Sir John Ingilby, Bart.
Mr Edward Kendrick.

COLONIES AND TRADE.

Edward Webſter, Eſq;
Mr Joſeph Pourcin.

MISCELLANEOUS MATTERS.

Mr Joſeph Jacob,
Mr Abraham Hall.

PREMIUMS

OFFERED BY THE

SOCIETY

FOR THE ENCOURAGEMENT OF

ARTS, MANUFACTURES

AND

COMMERCE,

IN THE YEAR,

M DCC LXXXVIII.

TO THE

PUBLICK.

ADELPHI BUILDINGS, *April* 10, 1788.

THE chief objects of the attention of the Society for the Encouragement of Arts, Manufactures, and Commerce, in the application of their Rewards, are Ingenuity in the ſeveral branches of the Polite and Liberal Arts; uſeful Diſcoveries and Improvements in AGRICULTURE, MANUFACTURES, MECHANICKS, and CHEMISTRY, or the laying open any ſuch to the Publick; and in general, all ſuch uſeful Inventions, Diſcoveries, or Improvements (though not mentioned in the Book of Premiums) as may appear to have a tendency to the advantage of Trade and Commerce; the Society therefore, in purſuance of their plan, propoſe to beſtow the following Premiums:

Premiums

Premiums for Planting and Huſbandry.

1. ACORNS. For having ſet, agreeably to the conditions publiſhed in the liſt of premiums laſt year, between the firſt of October, 1787, and the firſt of April, 1788, the greateſt quantity of ſtrong land, not leſs than ten acres with acorns, and ſeeds or cuttings of other trees, and for the effectually fencing and preſerving the ſame, in order to raiſe timber and underwood; the gold medal.

2. For the ſecond greateſt quantity of land, not leſs than five acres, ſown or ſet agreeably to the above conditions; the ſilver medal.

CERTIFICATES of ſetting or ſowing agreeably to the above conditions, and that there are not fewer than three hundred young Oaks on each acre; to be delivered to

to the Society, on or before the firſt Tueſday in November, 1788.

3, 4. The ſame premiums are extended one year further.

CERTIFICATES to be produced on or before the firſt Tueſday in November, 1789.

5, 6. The ſame premiums are extended one year further.

CERTIFICATES to be produced on or before the firſt Tueſday in November 1790.

7, 8. The ſame premiums are extended one year further.

CERTIFICATES to be produced on or before the firſt Tueſday in November 1791.

9. RAISING OAKS. To the perſon who ſhall have raiſed the greateſt number of Oaks, not fewer than five thouſand, either from young plants, or from acorns, in woods, parks, or foreſts, that have long been under timber, and effectually fenced and preſerved the ſame, in order to ſecure a ſucceſſion of oak timber in this kingdom; the gold medal.

10. For the next greateſt quantity, not fewer than three thouſand; the ſilver medal.

CERTIFICATES and Accounts to be produced on or before the firſt Tueſday in January, 1789.

11, 12. The ſame premiums are extended one year further.

CERTIFICATES to be produced on or before the firſt Tueſday in January, 1790.

13, 14,

13, 14. The ſame premiums are extended one year further.

CERTIFICATES that there were on the land, upon the firſt of November 1790, at leaſt the number of young Oak trees required, in a thriving condition effectually fenced and preſerved, with an account of the methods purſued in making and managing the plantation; to be produced to the Society on or before the firſt Tueſday in January, 1791.

15. OBSERVATIONS ON OAK. To the perſon who ſhall furniſh the beſt obſervations and experiments on the various obſtructions to the growth of Oak trees, with appoſite remedies for the ſame; and ſhall alſo aſcertain thoſe appearances on Oak trees, which may ſerve to ſhew them to have arrived at the proper period, and to be in a fit ſtate to be

felled for the purpoſes of ſhip building, and other uſes, the gold medal.

The Accounts to be produced to the Society, on or before the third Tueſday in December 1789.

16. CHESNUTS. For having ſown or ſet agreeably to the conditions publiſhed in the liſt of premiums laſt year, between the firſt of October, 1787, and the firſt of April 1788, the greateſt quantity of dry loamy land, not leſs than ſix acres, with a mixture of Spaniſh Cheſnuts and the ſeeds or cuttings of other trees adapted to ſuch ſoil, and for effectually fencing and preſerving the ſame, in order to raiſe timber; the gold medal.

17. For the ſecond greateſt quantity not leſs than four acres; the ſilver medal.

CERTIFICATES of ſowing or ſetting agreeably to the above conditions, and that there

there are not fewer than three hundred Chefnut plants in a thriving ſtate on each acre, to be delivered to the Society, on or before the firſt Tueſday in November 1788.

18, 19. The ſame premiums are extended one year further.

CERTIFICATES to be delivered on or before the firſt Tueſday in November 1789.

20, 21. The ſame premiums are extended one year further.

CERTIFICATES to be delivered on or before the firſt Tueſday in November 1790.

22, 23. The ſame premiums are extended one year further.

CERTIFICATES to be delivered on or before the firſt Tueſday in November 1791.

24. ELM. For having planted the greateſt number of the Engliſh Elm, not

leſs than eight thouſand, between the twenty-fourth of June, 1787, and the twenty-fourth of June, 1788, and for the having effectually fenced and preſerved the ſame, in order to raiſe timber; the gold medal.

25. For the ſecond greateſt number, not leſs than five thouſand; the ſilver medal.

26. For the third greateſt number, not leſs than four thouſand; the ſilver medal.

CERTIFICATES of the having planted agreeably to the above conditions, and ſpecifying the diſtance of the trees, muſt be delivered to the Society, on or before the firſt Tueſday in November, 1788.

27, 28, 29. The ſame premiums are extended one year further.

CERTIFICATES of the having planted agreeably to the above conditions, that the plants

plants were in a healthy and thriving ſtate two years at leaſt, after making the plantation, and ſpecifying the diſtance of the plants; to be delivered to the Society, on or before the firſt Tueſday in November, 1792.

30. LARCH. For having planted out, from the twenty-fourth of June 1787, to the twenty-fourth of June 1788, at a diſtance not more than five feet, the greateſt number of Larch-trees, not leſs than five thouſand; the plants to be between two and four years old when planted out; and for having effectually fenced and preſerved the ſame, in order to raiſe timber; the gold medal.

31. For the ſecond greateſt number, not leſs than three thouſand; the ſilver medal.

CERTIFICATES of having planted agreeably to the above conditions, to be

delivered on or before the laſt Tueſday in November 1788.

32. LARCH. For having planted out between the twenty-fourth of June 1789, and the twenty-fourth of June 1790, in a mixed plantation of foreſt trees, the greateſt number of Larch trees not fewer than five thouſand, and for having effectually fenced and preſerved the ſame in order to raiſe timber; the gold medal.

33. For the next greateſt number, not fewer than three thouſand; the ſilver medal.

CERTIFICATES of the number of plants, that they were in a healthy and thriving ſtate, two years at leaſt, after they were planted out, with a general account of the methods uſed in making the plantation; to be delivered to the Society

Society on or before the laſt Tueſday in December 1793.

34. SILVER FIR. For having planted out between the twenty-fourth of June 1789, and the twenty-fourth of June, 1790, in a mixed plantation of foreſt-trees, the greateſt number of Silver Firs, not fewer than two thouſand, and for having effectually fenced and preſerved the ſame in order to raiſe timber; the gold medal.

35. For the next greateſt number not fewer than one thouſand; the ſilver medal.

CERTIFICATES of the number of plants, that they were in a healthy and thriving ſtate, two years at leaſt, after they were planted out, with a general account of the methods uſed in making the plantation, to be delivered to the Society on or before the laſt Tueſday in December 1793.

36. HUN-

36. HUNTINGDON WILLOW. For the greateſt number of acres, not leſs than three, planted in the year, 1788, with Huntingdon Willows; the number of cuttings to be at leaſt one thouſand on each acre, properly fenced and ſecured; the gold medal.

CERTIFICATES to be produced on or before the laſt Tueſday in December, 1789.

37. UPLAND OR RED WILLOW. For the greateſt number of acres, not leſs than three, planted before the end of April 1788, with Upland or Red Willow, properly fenced and ſecured, the number of plants on each acre to be at leaſt twelve hundred; the gold medal.

CERTIFICATES to be produced on or before the laſt Tueſday in April, 1789.

It is well known that this ſpecies of Willow thrives well on dry ſandy land.

38. The

38. The ſame premium is extended one year further.

CERTIFICATES of the number of plants, and that they were in a thriving ſtate at the time of ſigning ſuch certificates; to be produced to the Society on or before the laſt Tueſday in April 1790.

39. ALDER. For the greateſt number of acres, not leſs than ſix, planted in the year 1787, with Alders, to be at leaſt one thouſand on each acre, properly fenced and ſecured.

CERTIFICATES to be produced to the Society, on or before the laſt Tueſday in December, 1788, of the ſaid planting, and that the trees were then growing on the land; the gold medal.

40. ALDER. For having planted in the year 1789, the greateſt number of Alders not leſs than three thouſand on an eſtate the property of one perſon; the gold medal.

CER-

CERTIFICATES of the number of the plants, and that they were in a thriving ſtate, two years at leaſt, after being planted; to be delivered to the Society, on or before the laſt Tueſday in December 1792.

41. ASH. For having planted the greateſt number of acres not leſs than ſix, in the year 1787, with Aſh for timber; the plants to be at leaſt two years old, properly ſecured and fenced; the number of plants on each acre to be at leaſt twelve hundred; the gold medal.

42. For the next greateſt number of acres, not leſs than four; the ſilver medal.

CERTIFICATES to be delivered on or before the ſecond Tueſday in December, 1788.

43. ASH. For having ſown or ſet in the year 1788, the greateſt quantity of land,

land, not leſs than ſix acres, with Aſh for timber, intermixed with the ſeeds, cuttings or plants of ſuch other trees as are adapted to the ſoil; the gold medal.

44. For the next greateſt quantity not leſs than four acres; the ſilver medal.

CERTIFICATES of the ſowing or ſetting agreeably to the above conditions, and that there are not fewer than one hundred Aſh plants on each acre; to be delivered to the Society on or before the laſt Tueſday in December, 1789.

45, 46. The ſame premiums are extended one year further.

CERTIFICATES to be delivered on or before the laſt Tueſday in December 1790.

47. ASH. For having ſown, or ſet in the year 1790, the greateſt quantity of land, not leſs than ſix acres, with Aſh for

for timber, intermixed with ſeeds, cuttings or plants of ſuch other trees as are adapted to the ſoil; the gold medal.

48. For the next greateſt quantity, not leſs than four acres; the ſilver medal.

CERTIFICATES of the ſowing or ſetting agreeably to the above conditions, that there are not fewer than one hundred Aſh plants on each acre, in a thriving and healthy condition, two years at leaſt, after the ſowing or ſetting, with a general account of the methods uſed in making the plantation; to be delivered to the Society on or before the laſt Tueſday in December, 1793.

49. MIXED TIMBER TREES. To the perſon who ſhall have incloſed, planted or ſown the greateſt number of acres, not leſs than ten, with the beſt ſorts of Foreſt trees, for timber, between the firſt of

of October, 1784, and the firſt of May, 1786; the gold medal.

An Account of the methods uſed in making the plantations, and of the nature of the ſoil, together with proper Certificates that the trees were in a thriving and healthy ſtate, two years, at leaſt, after making the plantation, to be delivered to the Society on or before the firſt Tueſday in November, 1788.

50. The ſame premium is extended one year further.

The Accounts and Certificates to be delivered to the Society on or before the firſt Tueſday in November, 1789.

51. The ſame premium is extended one year further.

The Accounts and Certificates to be delivered to the Society on or before the firſt Tueſday in November, 1790.

52. The

52. The ſame premium is extended one year further.

The Accounts and Certificates to be delivered to the Society on or before the firſt Tueſday in November, 1791.

53. MULBERRY CUTTINGS. For having raiſed the greateſt number of white or black Mulberry Tees, for feeding Silk Worms, not leſs than three hundred, from cuttings in the year 1785, the gold medal.

CERTIFICATES of the raiſing and growth, with the manner of culture, and that the plants were growing in September, 1788, to be produced on or before the firſt Tueſday in November, 1788,

54. MULBERRY CUTTINGS. To the perſon who ſhall have formed in the year 1785, the largeſt plantation, not leſs than

than one acre of Mulberry Cuttings for the purpoſe of feeding Silk Worms; the gold medal.

CERTIFICATES of the quantity of land and the method of culture, that the Mulberry Plants are not more than three feet aſunder, and that they were growing in the month of September, 1788; to be produced on or before the firſt Tueſday in December, 1788.

It is propoſed that this Plantation be continually kept in a low ſtate, to the intent that the gathering the leaves may always be within the reach of women and children.

55. MULBERRY CUTTINGS OR TREES. For having planted the greateſt number of white or black Mulberry Cuttings or Trees, not fewer than three

hundred, in the year 1787, for the purpoſe of feeding Silk Worms; the gold medal, or twenty pounds.

56. For the ſecond greateſt quantity, not fewer than one hundred and fifty; the ſilver medal, or ten pounds.

CERTIFICATES of ſuch planting, with the manner of culture, and that the trees were growing in the month of July, 1789, to be produced to the Society on or before the firſt Tueſday in November, 1789.

57. The ſame premiums are extended one year further.

CERTIFICATES to be produced on or before the firſt Tueſday in November, 1790.

58. MULBERRY TREES IN HEDGE ROWS. To the perſon who ſhall plant in the year 1788, the greateſt number,

number, not fewer than one hundred layers, of the black or white Mulberry, in Hedge Rows, at a diſtance not leſs than twelve feet from each other; ten pounds.

59. For the next greateſt number not fewer than fifty; five pounds.

CERTIFICATES of the number of plants, and that the trees were then in a growing ſtate; to be delivered to the Society, on or before the firſt Tueſday in October, 1789.

*** *The Candidates for planting all kinds of Trees, are to certify, that the reſpective Plantations are properly fenced and ſecured, and particularly to ſtate the Condition the Plants were in at the time of ſigning ſuch Certificates.*

Any information which the Candidates for the foregoing Premiums may chuſe to commu-

nicate, relative to the methods made uſe of in forming the Plantation, or promoting the growth of the ſeveral Trees, or any other obſervations that may have occurred on the ſubject, will be thankfully received.

60. TREES FOR USE WHEN EXPOSED TO THE WEATHER. To the perſon who ſhall ſend the moſt ſatisfactory account, verified by experiments, to determine which of the following trees is of the greateſt utility for timber or poles, for uſe, when expoſed to the weather; viz.

Larch,	Black Poplar,
Aſh,	Spaniſh Cheſnut,
Willow,	Alder,
Beech,	Silver Fir,
Lombardy Poplar;	

the gold medal.

The

The Accounts to be produced on or before the ſecond Tueſday in December, 1788.

61. The ſame premium is extended one year further.

The Accounts to be produced on or before the ſecond Tueſday in December, 1789.

62. PLANTING BOGGY OR MORASSY SOILS. For an account of the beſt ſet of experiments ſent by the planter or his repreſentative, to aſcertain the comparative advantages of planting boggy or moraſſy ſoils, with White Poplar, Black Poplar, Lombardy Poplar, and Willow; the gold medal.

It is required that not leſs than half an acre be planted with each, and the plants to be not more than four feet aſunder.

It is alſo required that the plantation ſtand fourteen years, at the end of which, to be all cut down and meaſured, or accurately meaſured ſtanding; the Certificates of the meaſure and value, and that the whole is properly fenced and ſecured, to be produced on or before the firſt Tueſday in January, 1792.

N. B. Any information relating to the ſtate of the plantation, if ſent to the Society, between the time of planting and claiming the premium, will be thankfully received.

63. The ſame premium is extended one year further.

CERTIFICATES to be produced on or before the firſt Tueſday in January 1793.

64. The ſame premium is extended one year further.

CER-

CERTIFICATES to be produced on or before the firſt Tueſday in January, 1794.

65. The ſame premium is extended to the year 1796.

CERTIFICATES to be produced on or before the firſt Tueſday in January, 1797.

66. The ſame premium is extended one year further.

CERTIFICATES to be produced on or before the firſt Tueſday in January, 1798.

67. COMPARATIVE CULTURE OF WHEAT. For the beſt ſet of experiments made on not leſs than eight acres, four of which to be ſown broad-caſt and four drilled, to aſcertain whether it is moſt advantageous to cultivate Wheat, by ſowing it in the common broad-caſt way, or by drilling it in equi-diſtant rows, hoeing the intervals; the gold medal.

It is required that an account of the nature and condition of the land on which the experiments are made, together with an account of the produce of the corn, be produced to the Society on or before the firſt Tueſday in February, 1789.

68. The ſame premium is extended one year further.

The Accounts to be produced to the Society on or before the firſt Tueſday in February, 1790.

69. COMPARATIVE CULTURE OF WHEAT. For the beſt ſet of experiments made on not leſs than eight acres of land, four of which to be ſown broad-caſt and four dibbled, to aſcertain whether it is moſt advantageous to cultivate Wheat, by ſowing it in the common broad-caſt way, or by dibbling it in equidiſtant rows, hoeing the intervals; the gold medal.

It

It is required that an account of the nature and condition of the land on which the experiments are made, together with an account of the produce of the corn, be produced to the Society on or before the firſt Tueſday in February, 1789.

70. The ſame premium is extended one year further. The Accounts to be produced to the Society on or before the firſt Tueſday in February, 1790.

71. BEANS AND WHEAT. To the perſon who ſhall have planted or drilled between the firſt of December, 1786, and the firſt of March 1787, the greateſt quantity of land, not leſs than ten acres, with Beans, and ſhall ſow the ſame land with Wheat in the ſame year, 1787; ten guineas.

It is required that an account of the ſort and quantity of Beans, the time of planting

planting or drilling, and of reaping or mowing them, the produce per acre threſhed, the application of the ſtraw, the expenſe of planting or drilling, hand or horſe-hoeing, the diſtance of rows and the quality of the ſoil, together with Certificates of the number of acres, and that the land was actually ſown with Wheat in the year 1787, to be produced on or before the firſt Tueſday in November, 1788.

N. B. The Society have been informed that Beans may be drilled or planted ſo early as the month of December, from whence may be derived the advantage of an early harveſt, in which caſe, the ſtraw will be far more valuable than that from a later planting or drilling.

72. The ſame premium is extended one year further. The Accounts to be produced

produced on or before the firſt Tueſday in November, 1789.

73. TURNEPS. For the beſt account of experiments made on at leaſt ſix acres of land, to determine the comparative advantages of the drill, or broad-caſt method in the cultivation of Turneps; the gold medal.

The Accounts to be delivered in, on or before the third Tueſday in April, 1789.

74. The ſame premium is extended one year further.

The Accounts to be delivered on or before the third Tueſday in April, 1790.

75. GREEN VEGETABLE FOOD. For the beſt account confirmed by experiments, of the vegetable Food, (Cabbages and

and Turneps excepted) growing in the months of March and April, that will moſt encreaſe the milk in Mares, Cows, and Ewes, at that ſeaſon; provided ſuch food can be cultivated at an expenſe that will admit of its being applied to the above purpoſes; the gold medal.

CERTIFICATES to be produced on or before the ſecond Tueſday in November, 1788.

76. The ſame premium is extended one year further.

CERTIFICATES to be produced on or before the ſecond Tueſday in November, 1789.

77. COMPARATIVE CULTURE OF THE TURNEP ROOTED CABBAGE. To the perſon who ſhall produce to the Society, the beſt account of the

the moſt ſatisfactory experiments, made on at leaſt four acres of land, to aſcertain the comparative advantages of the culture of the Turnep-rooted Cabbage, by ſowing it broad-caſt, and hoeing out the plants as is practiſed with the common Turnep, or by ſowing the Seed in Nurſeries and tranſplanting the plants at proper diſtances, hoeing the intervals; the ſilver medal, or ten pounds.

It is required that at leaſt two acres be cultivated in each manner, and Certificates of the culture, with an account of the ſoil, expenſe and produce of each ſeparately, be produced on or before the firſt Tueſday in October, 1791.

78. The ſame premium is extended one year further.

CER-

CERTIFICATES and Accounts to be produced on or before the firſt Tueſday in October, 1792.

79. TURNEP-ROOTED CABBAGE. For having raiſed and duly cultivated Turnep-rooted Cabbage, in the year 1788, for the feeding Cattle or Sheep, on the greateſt number of acres, not leſs than ten, and giving an account of the ſoil, culture, time and manner of feeding off, produce, and the effects on Cattle or Sheep fed with it; the gold medal.

80. For the next greateſt number of acres not leſs than five; the ſilver medal.

CERTIFICATES of the quantity of land, with the accounts, to be produced on or before the laſt Tueſday in October, 1789.

81. The ſame premium is extended one year further.

CER-

CERTIFICATES to be produced on or before the laſt Tueſday in October, 1790.

82. CURE OF THE CURLED POTATOE. To the perſon who ſhall diſcover to the Society the nature and cauſe of the diſeaſe in the Potatoe-plant called THE CURLED POTATOE, and point out an effectual cure, the whole verified by repeated and ſatisfactory experiments; the gold medal, or thirty pounds.

The Accounts to be produced to the Society, on or before the third Tueſday in November, 1789.

83. POTATOES FOR FEEDING CATTLE AND SHEEP. To the perſon who ſhall in the year 1788, cultivate the greateſt quantity of land, not leſs than four acres, with Potatoes, for the ſole purpoſe of feeding Cattle and Sheep, the gold medal, or twenty guineas.

CER-

CERTIFICATES with ſatisfactory Accounts of the expenſe and manner of cultivating the Potatoes, and the application of them to the above purpoſes, and the ſucceſs that has attended the uſe of them, to be delivered to the Society, on or before the ſecond Tueſday in November, 1789.

84. The ſame premium is extended one year further.

CERTIFICATES to be delivered on or before the ſecond Tueſday in November, 1790.

N. B. Should any Gentleman have already cultivated Potatoes for the purpoſes mentioned in the above advertiſement, any information from him on the ſubject, will be thankfully received by the Society.

85. CUL-

85. CULTIVATING ROOTS AND HERBAGE FOR FEEDING SHEEP AND BLACK CATTLE. For the moſt ſatisfactory experiments made between Michaelmas, 1787, and the firſt of May, 1788, in order to aſcertain which of the following plants can be cultivated and houſed, or otherwiſe ſecured for winter fodder, to the greateſt advantage, viz.

Turnep-rooted Cabbage,	Carrots,
Turnep Cabbage,	Parſneps,
Turneps,	Potatoes.

The Accounts to be produced on or before the firſt Tueſday in November, 1788; the gold medal.

It is required that the above roots be taken off the land by the laſt day of October, 1787; that a Crop of Wheat may be ſown in the ſame ground, and the particulars of the ſowing and planting, tak-

ing up, produce, preſerving, and application to the feeding Sheep and Black Cattle, be ſpecified. The comparative experiments muſt be made between two or more of any of the above mentioned plants, and not leſs than two acres be cultivated with each particular kind of plant.

N. B. Great advantage will ariſe to the Farmer occupying land in the neighbourhood of extenſive commons, from the conveniency of keeping large flocks of Sheep, and herds of Cattle, if the difficulty of ſupporting them through the winter, was obviated by a due knowledge of this practice.

86. The ſame premium is extended one year further.

CERTIFICATES to be produced on or before the firſt Tueſday in November, 1789.

87. STOCKS

87. STOCKS OF BEES. To the perſon who ſhall have in his poſſeſſion, being his own property, the greateſt number of Stocks of Bees, not fewer than thirty, and who ſhall in the moſt judicious manner provide for them plenty of ſuch vegetables as afford them honey and wax; the gold medal, or twenty pounds.

88. For the next greateſt number, not fewer than twenty ſtocks; the ſilver medal, or ten pounds.

Proper Certificates of the number of Stocks, and that they have been in the poſſeſſion of the Claimant during the preceding ſummer, together with a particular account of the vegetables provided for their ſuſtenance, and the manner in which they have been managed, to be produced

to the Society on or before the firſt Tueſday in November, 1789.

89. The ſame premium is extended one year further.

CERTIFICATES to be delivered on or before the laſt Tueſday in November, 1790.

90. CULTIVATING THE TRUE RHUBARB. For having raiſed before the end of the year 1788, the greateſt number of plants, not leſs than three hundred, of Rheum Palmatum, or true Rhubarb; the gold medal.

91. For the next greateſt quantity, not leſs than two hundred plants; the ſilver medal.

CERTIFICATES of the number of plants, that they ſtand at leaſt four feet aſunder, that they have been in a thriving ſtate

ſtate during the preceding ſummer, with an account of the ſoil, culture, and aſpect, to be produced on or before the ſecond Tueſday in February, 1789.

92, 93. The ſame premiums are extended one year further.

CERTIFICATES to be produced on or before the ſecond Tueſday in February, 1790.

94. RHUBARB. For the greateſt quantity of Rhubarb of Britiſh growth, not leſs than twenty pounds weight, equal to ſuch as is commonly ſold in the ſhops, under the name of Turkey, or Ruſſia Rhubarb; five pounds of which to be produced as a ſample, with Certificates that the remainder is of equal goodneſs; and a particular Account of the manner of culture and cure, on or be-

fore the firſt Tueſday in November, 1788; the gold medal.

95. For the next greateſt quantity not leſs than ten pounds weight; the ſilver medal.

96, 97. The ſame premiums are extended one year further.

The Samples and Certificates to be produced on or before the firſt Tueſday in November, 1789.

98. ASCERTAINING THE COMPONENT PARTS OF ARABLE LAND. To the perſon who ſhall produce to the Society the moſt ſatisfactory ſet of experiments, to aſcertain the due proportion of the ſeveral component parts of Arable Land, in one or more counties in Great Britain, by an accurate analyſis of it, and who having made a like ana-

lyſis

lyſis of ſome poor land, ſhall, by comparing the component parts of each, and thereby aſcertaining the deficiencies in the poor ſoil, improve a quantity of it, not leſs than two acres, by the addition of ſuch parts as the former experiments ſhall have diſcovered to be wanting therein, and therefore probably the cauſe of its ſterility; the gold medal.

It is required that the manurings, ploughings, and crops of the improved land, be the ſame after the improvement as before, and that a minute account of the produce in each ſtate; of the weather, and of the various influencing circumſtances, together with the method made uſe of in analyſing the ſoils, be produced, with proper certificates, and the chemical reſults of the analyſis, which are to remain the property of the Society, on or before the laſt Tueſday in November, 1788.

It is expected that a quantity, not leſs than ſix pounds, of the rich, of the poor, and of the improved ſoils, be produced with the Certificates.

N. B. Among the methods or proceſſes made uſe of by Chemiſts, and called DRY or MOIST, the latter only appears adapted to the aſcertaining the reſpective proportions of the component parts of Arable earth.—Dr Shaw, in his Chemical Lectures.—Dr Home, in his principles of Agriculture. Dr George Fordyce, in his Elements of Agriculture, and Sir Torben Bergman, in his 'Diſſertation ſur les Terres geoponiques,' have treated of theſe ſubjects.

99. The ſame premium is extended one year further.

The Accounts to be produced on or before the laſt Tueſday in November, 1789.

100. The

100. The ſame premium is extended one year further.

The Accounts to be produced on or before the laſt Tueſday in November, 1790.

101. The ſame premium is extended one year further.

The Accounts to be produced on or before the laſt Tueſday in November, 1791.

102. The ſame premium is extended one year further.

The Accounts to be produced on or before the laſt Tueſday in November, 1792.

103. IMPROVING LAND LYING WASTE. For the beſt Account of a method

method of improving any of the following ſoils, being land lying waſte or uncultivated, viz. Clay, Gravel, Sand, Chalk, Moor or Peat-earth, and Bog; verified by experiments on not leſs than ten acres of land, to be produced on or before the ſecond Tueſday in December, 1788; the gold medal for each.

104. For the next in merit; the ſilver medal.

The ſoil, manner of improvement, expenſe and product, are required to be fully explained.

105, 106. The ſame premiums are extended one year further.

The Accounts to be produced on or before the ſecond Tueſday in December, 1789.

107, 108.

107, 108. The ſame premiums are extended one year further.

The Accounts to be produced on or before the ſecond Tueſday in December, 1790.

109. MANURES. To the perſon who ſhall give the moſt ſatisfactory Account, verified by accurate experiments, on what ſoil the application of Marl, Chalk, Lime, or Clay ſeverally, as manures, be moſt beneficial; the gold medal.

It is required that each experiment be made on one acre, and that they be continued four years, the ſame kind of Grain being ſown the ſame year on the ſeveral ſpots.

It is alſo required, that if different manures are compared, the experiments be

be made on ſimilar ſoils, lying near each other.

An Account of the nature of the ſoil, manure, and the quantity laid on, with all expenſes and crops to be delivered, with ſpecimens of the ſoil and manure, on or before the firſt Tueſday in January, 1789.

110. The ſame premium is extended one year further.

The Accounts and ſpecimens to be produced on or before the firſt Tueſday in January, 1790.

111. MANURES. For the moſt ſatisfactory ſet of experiments, to aſcertain the comparative advantages of the following Manures, uſed as Top-dreſſings, on Graſs or Corn Land, viz. Soot, Coal-Aſhes, Wood-Aſhes, Lime, Night-Soil; the gold medal.

It

It is required that not leſs than half an acre of land be appropriated to each Manure, the ſoils ſimilar, and lying near each other, and if the Manure be uſed on Corn Land, then it is required that the ſame kind of Grain be ſown the ſame year on each ſpot; the experiments to be continued not leſs than two years.

An Account of the nature of the ſoil, quantity, and expenſe of the Manure and Crops, with Certificates to be produced on or before the firſt Tueſday in December, 1788.

112. The ſame premium is extended one year further.

The Account and Certificates to be produced on or before the firſt Tueſday in December, 1789.

113. IMPROVING WASTE MOORS

For the improvement of the greateſt number

ber of acres of Waſte Moor Land, not leſs than one hundred; the gold medal.

It is required that the land before improvement, be abſolutely uncultivated, in a great meaſure uſeleſs, not let to any tenant, and without any building upon it except cottages or huts. That in its improved ſtate, it ſhall be encloſed, cultivated, and divided into fields, with buildings erected thereon, ſufficient for the uſe and reſidence of a tenant.

CERTIFICATES of the number of acres of the quality of the Moor ſo improved, of the mode and expenſe of the improvement; the ſtate it is in as to the proportion of graſs to arable, and the rent at which it is let; to be produced on or before the firſt Tueſday in February, 1789.

114. The ſame premium is extended one year further.

CER-

CERTIFICATES to be produced on or before the firſt Tueſday in February 1790.

115. IMPROVING WASTE MOORS. For the improvement of the greateſt number of acres of Waſte Moor Land, not leſs than one hundred; the gold medal.

It is required that the Land before improvement, be abſolutely uncultivated, and in a great meaſure uſeleſs, that in its improved ſtate it be encloſed, cultivated and divided into fields ſufficient for the uſe and occupation of a tenant.

CERTIFICATES of the number of acres of the quality of the Moor ſo improved, of the mode and expenſe of the improvement, the ſtate it is in as to the proportion of graſs to arable, and the average value thereof to be produced on or before the firſt Tueſday in February, 1791.

116. GAIN-

116. GAINING LAND FROM THE SEA. To the perſon who ſhall produce to the Society, an account of the beſt method, verified by actual experiment, of gaining Land from the Sea, not leſs than twenty acres, on the coaſt of England or Wales; the gold medal.

CERTIFICATES of the quantity of Land, and that the experiments were begun after the firſt of January, 1783, to be produced to the Society on or before the firſt Tueſday in October, 1788.

N. B. The Society have been credibly informed, that land has been gained on the coaſt of Holland, by fixing rows of whiſps of ſtraw upright in the ſand, at about a foot diſtant from each other, or by fixing ſtakes at proper diſtances from each other and whatling ſtraw bands between them.

117. The

117. The ſame premium is extended one year further.

CERTIFICATES to be produced on or before the firſt Tueſday in October, 1789.

118. The ſame premium is extended one year further.

CERTIFICATES to be produced on or before the firſt Tueſday in October, 1790.

119. The ſame premium is extended one year further.

CERTIFICATES to be produced on or before the firſt Tueſday in October, 1791.

120. MACHINE TO ANSWER THE PURPOSE OF REAPING OR MOWING CORN. For inventing a

Machine to anſwer the purpoſe of mowing or reaping Wheat, Rye, Barley, Oats, or Beans, by which it may be done more expeditiouſly and cheaper, than by any method now practiſed, provided it does not ſhed the Corn or Pulſe, more than the methods in common practice, and that it lays the ſtraw in ſuch manner as may be eaſily gathered up for binding; ten guineas.

The Machine with Certificates that at leaſt three acres have been cut by it, to be produced to the Society, on or before the ſecond Tueſday in December, 1788.

Simplicity and cheapneſs in the conſtruction, will be conſidered as principal parts of its merit.

121. The ſame premium is extended one year further.

To

To be produced on or before the ſecond Tueſday in December, 1789.

122. IMPROVED HOE. To the perſon who ſhall produce to the Society, the moſt improved or beſt conſtructed Horſe, or Hand-Hoe, ſuperior to any hitherto in uſe, for the purpoſe of clearing from Weeds, and looſening the Soil in, the intermediate ſpaces of all Crops of Corn, ſown in equidiſtant rows, and which ſhall earth up the young Plants at the ſame time; the gold medal, or twenty guineas.

A Hoe, with Certificates of its having been ſucceſsfully uſed, to be produced to the Society, on or before the firſt Tueſday in December, 1789.

123. DESTROYING THE GRUB OF THE COCKCHAFER. To the

perſon who ſhall diſcover to the Society, an effectual method, verified by repeated and ſatisfactory trials, of deſtroying the Grub of the Cockchafer, ſo deſtructive to the roots of all ſorts of Corn, Peas, Beans, and Turneps; the ſilver medal.

The Accounts to be produced on or before the firſt Tueſday in January, 1789.

Premiums

Premiums for Diſcoveries and Improvements in Chemiſtry, Dying and Mineralogy.

124. KELP. For the greateſt quantity, not leſs than four tons of Kelp, containing a much larger proportion of Alkaline Salt than any Kelp now made for ſale; twenty pounds.

A ſpecimen of one hundred weight, to be produced on or before the firſt Tueſday in January, 1789; together with Certificates that the whole quantity is equal to the ſpecimen, and made in Great Britain or Ireland, of Sea Weed.

125. BARILLA. For the greateſt quantity of merchantable Barilla, not leſs than half a ton, made from Spaniſh Kali, raiſed in Great Britain; the gold medal.

A ſample of not leſs than twenty-eight pounds, with a Certificate that half a ton

has been made; to be produced on or before the firſt Tueſday in January, 1789.

126. DISSERTATION ON ALKALI. To the perſon who ſhall compoſe the beſt diſſertation on the nature and qualities of vegetable and mineral Alkali, containing an account of their analogy to each other, and of the moſt eſſential properties wherein they differ; together with any uſeful remarks that may have eſcaped the notice of chemical Writers, explaining alſo the means of ſeperating them from each other, but more particularly from ſea ſalt, or other neutral ſalts which are frequently found united with them; ſo that when purified, they may be advantageouſly uſed in ſuch manufactures wherein the admixture of neutral ſalts is detrimental: Laſtly, an inveſtigation into the nature of their compoſition and the method of decompounding them into their conſtituent principles; the gold medal, or fifty pounds.

The

The Diſſertation to be produced to the Society, on or before the firſt Tueſday in March, 1789.

127. PRESERVING SEEDS OF VEGETABLES. For the beſt method of preſerving the Seeds of Plants in a ſtate fit for vegetation, a longer time than has hitherto been practiſed, ſuch method being ſuperior to any known to the publick, and verified by ſufficient trial; to be communicated to the Society on or before the firſt Tueſday in December, 1788; the gold medal.

128. DESTROYING SMOKE. For the beſt Account, aſcertained by proper experiments, of a method of deſtroying or burning the ſmoke of fires belonging to Steam Engines, Furnaces employed in calcining or ſmelting metals, or other large works, in order to prevent annoy-

ance to the neighbourhood; to be produced on or before the firſt Tueſday in January, 1789; the gold medal.

129. The ſame premium is extended one year further.

The Accounts to be produced on or before the firſt Tueſday in January, 1790.

130. CANDLES FROM RESIN. To the perſon who ſhall diſcover to the Society, the beſt method of ſo reducing the inflamable quality of Reſin, as to adapt it to the purpoſes of making Candles fit for common uſe, at a price much inferior to that of Candles made of Tallow only; the gold medal, or thirty guineas.

Six Pounds at leaſt of the Candles ſo prepared, with an Account of the proceſs, to be delivered to the Society, on

or

or before the firſt Tueſday in December, 1788.

131. SUBSTITUTE FOR OR PREPARATION OF YEAST. For diſcovering to the Society an effectual Subſtitute for Yeaſt, or preparation of Yeaſt, which after being kept two months, ſhall be fit for fermenting liquors, and raiſing bread; the gold medal, or twenty pounds.

Specimens of the Subſtitute, or of the preparation of Yeaſt, ſufficient for trials, together with a paper ſealed up, and containing an account of the compoſition of the Subſtitute, or method of preparing the Yeaſt, to be produced on or before the laſt Tueſday in November, 1788.

132. INCREASING STEAM. To the perſon who ſhall diſcover to the Society, a method, verified by actual experiments, of increaſing the quantity, or the

the force of Steam, in Steam Engines, with leſs fuel than is uſually employed, provided that in general the whole amount of the Expenſes in uſing Steam Engines may be conſiderably leſſened; the gold medal.

To be communicated to the Society on or before the firſt Tueſday in January, 1789.

N. B. As it is well known there are methods of preventing the ebullition of liquids, by the addition of particular matters in the boiling, it is ſubmitted to the conſideration of the ingenious, whether by the addition of ſome matters, or by ſome mechanical operations, the boiling and evaporation may not be increaſed?

133. The ſame premium is extended one year further.

To

To be communicated to the Society, on or before the firſt Tueſday in January, 1790.

134. PREVENTING THE DRY ROT IN TIMBER. To the perſon who ſhall diſcover to the Society, the cauſe of the Dry-Rot in Timber, and diſcloſe a certain method of prevention, ſuperior to any hitherto known; the gold medal.

The Accounts of the cauſe and method of prevention, confirmed by repeated experiments, to be produced to the Society on or before the ſecond Tueſday in December, 1788.

135. The ſame premium is extended one year further.

The Accounts to be produced on or before the ſecond Tueſday in December, 1789.

136. FINE

136. FINE BAR IRON. To the perſon, in England or Wales, who ſhall make in the year 1788, the greateſt quantity of Bar Iron, not leſs than ten tons, with Coak from Coak Pigs, equal in quality to the beſt Iron imported from Sweden or Ruſſia, and fit for converting into Steel; the gold medal.

Samples, not leſs than one hundred weight, with Certificates that the whole quantity is of equal quality, to be produced to the Society, on or before the firſt Tueſday in January, 1789.

137. The ſame premium is extended one year further.

SAMPLES and CERTIFICATES to be delivered on or before the firſt Tueſday in January, 1790.

138. METHOD OF PREPARING WHITE LEAD WHICH SHALL NOT

NOT BE PREJUDICIAL. To the perſon who ſhall diſcover to the Society, a method of preparing White Lead, in a manner that ſhall not be prejudicial to the health either of the workmen employed in making or uſing it, and will anſwer all the purpoſes for which White Lead is at preſent uſed; fifty pounds.

A quantity of the White Lead ſo prepared, with an account of the proceſs made uſe of, and Certificates that not leſs than one ton has been manufactured in the ſame manner, to be produced to the Society on or before the ſecond Tueſday in November, 1789.

163. SUBSTITUTE FOR THE BASIS OF PAINT. To the perſon who ſhall produce to the Society the beſt ſubſtitute, ſuperior to any hitherto known, for the Baſis of Paint, equally proper for the

the purpoſe as the White Lead now employed; ſuch ſubſtitute not to be of a noxious quality, and which may be afforded at a price not materially higher than that of White Lead; thirty pounds.

A quantity of the Subſtitute, not leſs than fifty pounds weight, with an Account of the proceſs uſed in preparing it, and Certificates that at leaſt five hundred weight has been manufactured, to be produced to the Society, on or before the ſecond Tueſday in November, 1789.

Premiums

Premiums for promoting the Polite Arts.

140. HONORARY PREMIUMS FOR DRAWINGS. For the beſt Drawing of any kind, made with Crayons, Chalk, Black Lead, Pen, Indian Ink, or Biſter, by young Gentlemen under the age of twenty-one, ſons or grandſons of Peers or Peereſſes, in their own right, of Great Britain or Ireland; to be produced on or before the firſt Tueſday in March, 1789; the honorary medal of the Society in gold.

141. The ſame in ſilver, for the ſecond in merit.

142, 143. The ſame premiums will be given on the like conditions, to young Ladies, daughters or grand daughters of Peers or Peereſſes, in their own right, of Great Britain or Ireland.

144. HO-

144. HONORARY PREMIUMS FOR DRAWINGS. For the beſt Drawings of any kind made with Crayons, Chalk, Black Lead, Pen, Indian Ink, or Biſter; by young Gentlemen under the age of twenty-one.

To be produced on or before the firſt Tueſday in March, 1789; the gold medal.

145. For the next in merit; the ſilver medal.

146, 147. The ſame premiums will be given for Drawings by young Ladies.

N. B. Perſons profeſſing any branch of the Polite Arts, or any buſineſs dependant on the arts of deſign, or the ſons or daughters of ſuch perſons, will not be admitted Candidates in theſe claſſes.

The

The following Premiums are offered in conformity to the Will of the late John Stock, of Hampſtead, Eſq.

148. SCULPTURE. For the beſt Model of the Buſt of his Royal Highneſs the Prince of Wales, as large as the life; to be produced on or before the third Tueſday in November, 1788; a ſilver medallion, with the following engraved inſcription: *The Premium given by the Society for the Encouragement of Arts, Manufactures and Commerce, in conformity to the Will of John Stock, of Hampſtead, Eſq.*

A Caſt from the Model to which the Premium is adjudged, is to remain the property of the Society.

149. PORTRAIT. For the beſt Copy, in Oil Colours, of a Portrait of the late JOHN STOCK, of Hampſtead, Eſq;

to be produced on or before the third Tuesday in November, 1788; a silver medallion, with the following engraved inscription: *The Premium given by the Society for the Encouragement of Arts, Manufactures and Commerce, in Conformity to the Will of John Stock, of Hampstead, Esq.*

150. DRAWINGS OF OUTLINES. For the best Outline after an original group or cast in plaster of human figures, by persons of either sex under the age of sixteen, the principal Figure not less than twelve inches; to be produced on or before the last Tuesday in November, 1788; the greater silver pallet.

151. For the next in merit; the lesser silver pallet.

N. B. These Drawings are to be made on Paper with Chalk, Black Lead, Indian Ink,

Ink, or Biſter; and the originals either to be produced to the Society, or to be referred to for their examination.

152. DRAWINGS OF MACHINES. For the beſt Perſpective Drawing, by perſons of either ſex, under the age of twenty one years, of the Model of a Crane, by Mr Bunce, in the Society's Repoſitory, ſhewing particularly the method of ſtopping the Wheel by the centrifugal force of the Ball, the greater ſilver pallet; to be produced on or before the third Tueſday in November, 1788.

N. B. Such Candidates as propoſe to make Drawings for this Premium, will be admitted by the Regiſter any day (Sundays or Wedneſdays excepted) between the hours of ten and two.

The Drawing to which the Premium is adjudged, is to remain the property of the Society.

153. DRAWINGS OF LANDSCAPES. For the beſt Drawing of a Landſcape after nature, by perſons of either ſex under twenty one years of age, to be produced on or before the third Tueſday in November, 1788; the greater ſilver pallet.

154. For the next in merit; the leſſer ſilver pallet.

Each Candidate muſt mention, on the front of the Drawing, from whence the View was taken; and the Drawings muſt be made with Chalk, Pen, Indian Ink, or Biſter.

155. HISTORICAL DRAWINGS. For the beſt Hiſtorical Drawing, being an

an original compoſition of five or more Human Figures; the height of the principal Figure not leſs than eight inches. To be made with Crayons, Chalk, Black Lead, Pen, Indian Ink, or Biſter, and to be produced on or before the third Tueſday in November, 1788; the gold pallet.

156. For the next in merit; the greater ſilver pallet.

157. ENGRAVING IN THE LINE MANNER. To the Engraver who ſhall produce to the Society, the beſt engraved Plate executed by himſelf of the dimenſions of not leſs than twenty inches by ſixteen inches, containing not fewer than three Human Figures, the principal figure not leſs than twelve inches high; to be engraved in the LINE MANNER, from any old or modern Picture, the Plate to be publiſhed by the Engraver.

The regular progreſs of the work from the firſt Proof of the etching, to the finiſhed impreſſion of the Plate, to be produced to the Society on or before the firſt Tueſday in February, 1789; the gold pallet, and twenty-five guineas.

158. The ſame premium is extended one year further.

The Impreſſions to be delivered on or before the firſt Tueſday in February, 1790.

159. SURVEYS OF COUNTIES. To the perſon who in the year 1791, ſhall compleat and publiſh an accurate ſurvey of any one County in England or Wales, on a ſcale of not leſs than one inch to a mile, for which rewards have not already been given by the Society; the gold medal, or fifty pounds.

CER-

CERTIFICATES of the Accuracy of the Survey, and that it was begun after the firſt of June, 1787, together with the Map, to be produced on or before the laſt Tueſday in January, 1792.

The Map to which the Premium ſhall be adjudged to remain the property of the Society.

N. B. The Society are already in poſſeſſion of Surveys of the following Counties, viz. Devonſhire, Derbyſhire, Somerſetſhire, Northumberland, Suffolk, Leiceſterſhire, Cumberland, and Lancaſhire.

160. NATURAL HISTORY. To the Author who ſhall publiſh in the year 1788, the Natural Hiſtory of any County of England or Wales; the gold medal.

It is required that the ſeveral natural productions whether animal, vegetable or

mineral, peculiar to the County or found therein, be carefully and ſpecifically arranged and deſcribed, in order that the Publick may be enabled to judge what Arts or Manufactures are moſt likely to ſucceed in ſuch County.

The Work to be delivered to the Society on or before the laſt Tueſday in January, 1789.

161. The ſame Premium is extended one year further.

The Work to be delivered to the Society, on or before the laſt Tueſday in January, 1790.

CON-

CONDITIONS.

No perſon who has gained the firſt Premium in any Claſs, will be admitted a Candidate in a Claſs of an inferior age; and no Candidate ſhall receive more than one Premium in one year; nor will they, who for two ſucceſſive years, ſhall gain the firſt Premium in one Claſs, be ever again admitted as Candidates in that Claſs.

No Perſon ſhall ever be admitted a Candidate in any Claſs, in which he has three times obtained the whole of the firſt Premium.

No Candidate ſhall ſend in more than one Performance in any one Claſs.

All the Claims which are produced each year, before the Committee of Polite Arts (to which Premiums or Bounties are adjudged)

judged) are to remain with the Society ſix weeks after the determination, unleſs the Candidates, for particular reaſons, do apply to have the performances returned.

No Claim for a Premium in the Polite Arts will be admitted, that has obtained, or has been produced in order to obtain a Premium, Reward or Gratification from any other Society, or any Academy or School.

All Performances that obtain Premiums in the Polite Arts, muſt be begun after the publication of ſuch Premiums.

Purpoſely to encourage real merit, and to prevent any attempts to impoſe on the Society, by producing Drawings which ſhall have been made or retouched by any other Perſon than the Candidate, the Society is reſolved upon all occaſions, with reſpect

reſpect to the ſucceſsful Candidates in Claſſes 150 to 156 incluſive, to prove their abilities, by requiring a ſpecimen made under the inſpection of the Committee of Polite Arts, in every inſtance where ſuch proof can be obtained.

Premiums

Premiums for encouraging and improving Manufactures.

162. SILK. For the greateſt quantity of merchantable Silk, not leſs than five pounds, produced by any one Perſon in England, in the year 1788; the gold medal.

Specimens of the Silk, not leſs than one pound, with Certificates that the whole is of equal quality, and produced in England; to be delivered to the Society on or before the firſt Tueſday in January, 1789.

163. For the ſecond greateſt quantity, not leſs than two pounds; the ſilver medal.

164. MACHINE FOR CARDING SILK. For the beſt Machine, ſuperior

to

to any now in uſe, for carding Waſte Silk equally well as by hand; to be produced together with a ſpecimen of the Cardings, on or before the firſt Tueſday in November, 1788; the gold medal, or twenty pounds.

165. WEAVING FISHING NETS.

For the beſt ſpecimen of Plain Netting, for Fiſhing Nets, not leſs than twenty yards long, and ſix feet deep, woven in a Loom, or other Machine; to be produced to the Society, on or before the ſecond Tueſday in January, 1789; twenty guineas.

N. B. It is expected that the Specimen produced, be made in ſuch a manner, as to be cut and joined without more loſs than uſual, that it have ſuch a plain ſelvage as the common Fiſhing Nets, and that the Knot be equally faſt with thoſe in

in Nets in common uſe, and as eaſily repaired.

166. A ſtrong CLOTH being prepared in SWEDEN, from HOP STALKS, or BINDS, the Society will give the gold medal, or twenty pounds, as a Premium for the beſt and greateſt quantity of ſuch Cloth, not leſs than twenty-five yards, made in England, and produced to the Society on or before the ſecond Tueſday in December, 1788.

One Pound at leaſt of the Thread to be produced with the Claim.

167. The ſame Premium is extended one year further.

The Cloth and Thread to be produced to the Society, on or before the ſecond Tueſday in December, 1789.

112. The

168. The ſame Premium is extended one year further.

The Cloth and Thread to be produced to the Society, on or before the ſecond Tueſday in December, 1790.

169. PAPER FROM RAW VEGETABLE SUBSTANCES. To the Perſon in England or Wales, who ſhall make the greateſt quantity, not leſs than ten reams, of the beſt and moſt uſeful Paper, from Raw Vegetable Subſtances; ten guineas.

CERTIFICATES of the making ſuch Paper, and one ream of the Paper to be produced on or before the firſt Tueſday in November, 1788.

170. The ſame Premium is extended one year further.

CER-

CERTIFICATES and Samples to be produced on or before the laſt Tueſday in November, 1789.

N. B. The Society are in poſſeſſion of two volumes, containing a great variety of ſpecimens of Paper made from Raw Vegetables, viz. Thiſtles, Potatoe-Haum, Poplar, Hop-Binds, &c. which volumes may be inſpected by any Perſon on application to the Regiſter.

Premiums

Premiums for Inventions in Mechanicks.

171. TRANSIT INSTRUMENT. To the Perſon who ſhall invent and produce to the Society, a cheap and portable Tranſit Inſtrument, which may eaſily be converted into a Zenith Sector, capable of being accurately and expeditiouſly adjuſted for the purpoſes of finding the Latitudes and Longitudes of places, and ſuperior to any portable Tranſit Inſtrument now in uſe; the gold medal, or thirty guineas.

To be produced on or before the laſt Tueſday in January, 1789.

172. GUN HARPOON. For every Whale taken by means of the Gun Harpoon; to the Perſon who firſt ſtrikes ſuch fiſh therewith; two guineas.

N. B. Proper Certificates of the taking ſuch Whales, in the year 1783, ſigned

by the Maſter, or by the Mate when the Claim is made by the Maſter; to be delivered to the Society, on or before the laſt Tueſday in December, 1788.

173. GUN FOR THROWING HARPOONS. To the Perſon who ſhall produce to the Society, the beſt improvement in the conſtruction of a Gun for throwing Harpoons, ſo as to render it more manageable than thoſe at preſent in uſe; the ſilver medal, or ten guineas.

The Gun to be produced to the Society, on or before the firſt Tueſday in December, 1788.

174. HARPOON TO BE THROWN BY A GUN. To the Perſon who ſhall produce to the Society, the beſt improvement in the conſtruction of a Harpoon to be thrown by a Gun; the Harpoon to be

be ſo contrived, that it may ſtrike and hold the Fiſh with more certainty and greater effect than any hitherto made uſe of; the ſilver medal, or ten guineas.

The Harpoon to be produced to the Society, on or before the firſt Tueſday in December, 1788.

175. CROSS BOW, OR OTHER INSTRUMENT FOR THROWING HARPOONS. To the Perſon who ſhall produce to the Society, the beſt conſtructed Croſs Bow, or other Inſtrument to be uſed in the Whale Fiſhery for throwing Harpoons, with more advantage and greater effect than the Gun, or any other Inſtrument now in uſe; the ſilver medal, or ten guineas.

To be delivered to the Society, on or before the firſt Tueſday in December, 1788.

176. CROSS BOW HARPOON. For every Whale taken by means of a Harpoon, ſhot from a Croſs Bow; to the Perſon who firſt ſtrikes ſuch Fiſh therewith, two guineas.

Proper Certificates of the taking ſuch Whales in the year 1788, ſigned by the Maſter, or by the Mate when the Claim is made by the Maſter; to be delivered to the Society, on or before the laſt Tueſday in December, 1788.

177. DRIVING BOLTS INTO SHIPS. To the Perſon who ſhall invent and produce to the Society, a Model ſhewing a method of driving Bolts into Ships, particularly thoſe of Copper, without ſplitting the Head or bending them, with more diſpatch in all directions and tighter than by any means hitherto known or in uſe; twenty guineas.

The

The Model to be produced to the Society, on or before the firſt Tueſday in February, 1789.

178. IMPROVEMENT OF THE HAND VENTILATOR. To the Perſon who ſhall produce to the Society, on or before the laſt Tueſday in February, 1789, a Portable Ventilator, to be worked by hand, better adapted and more efficacious for extracting foul air from Goals, Priſons and Ships, than any now known or in uſe; the gold medal, or twenty guineas.

179. CRANES FOR WHARFS. To the Perſon who ſhall invent and produce to the Society, a Model of a Crane for Wharfs, on a ſcale of not leſs than one inch to a foot, the conſtruction to be ſuch that the effect of the power may be varied according to the weight to be raiſed, in a manner different from any now known

or in uſe, yet more ſimple and ef[illegible] the gold medal, or twenty guineas.

To be produced on or before the fi[illegible] Tueſday in February, 1789.

N. B. The Model ſhould neither be of the Walking Wheel nor Capſtan kind.

180. METAL ROPE OR CHAIN. To the Perſon who ſhall have invented a Chain or Rope of Copper, or other Metal, ſuperior to any hitherto made, ſufficiently flexible to work well and IN ALL DIRECTIONS over pullies, and which ſhall ſerve every purpoſe of a good Hempen Rope of at leaſt two inches diameter: the Candidate to produce to the Society ſatisfactory Certificates, that ſuch Metal Rope or Chain has been uſed to advantage in manufactories, or large works where Hempen Ropes have been hitherto employed; fifty pounds.

The

The Certificates and a Sample of the Metal Chain or Rope, not leſs than ten yards long, to be produced to the Society on or before the firſt Tueſday in November, 1789.

Although it is well known that the effect of the wind on horizontal Sails is greatly inferior to that on thoſe which move in a vertical direction, yet as there are ſome circumſtances and ſituations where it would be moſt convenient to erect an Horizontal Mill, the Society do therefore offer the following Premium.

181. HORIZONTAL WINDMILL. To the Perſon who ſhall invent and produce to the Society, a Model of an Horizontal Windmill on a ſcale of not leſs than one inch to a foot, ſuperior to thoſe already in uſe; the gold medal, or twenty guineas.

To be delivered to the Society, on or before the firſt Tueſday in February, 1789.

182. HAND MILL. To the Perſon who ſhall produce to the Society a better conſtructed Hand Mill, for general purpoſes, than any now known or in uſe; the ſilver medal, or ten guineas.

To be delivered to the Society, on or before the laſt Tueſday in December, 1788.

183. MACHINE FOR RAISING COALS, ORE, &c. &c. To the Perſon who ſhall invent a Machine for raiſing Coals, Ore, &c. from Mines, which ſhall produce the effect at a leſs expenſe than thoſe already known or in uſe; the gold medal, or twenty guineas.

A Model of the Machine made on a ſcale of not leſs than one inch to a foot; to be produced to the Society, on or before the ſecond Tueſday in February, 1789.

184. MACHINE FOR RAISING WATER. To the Perſon who ſhall invent a Machine, on a better, cheaper and more ſimple conſtruction than any hitherto in uſe, for raiſing Water out of Wells, &c. from a depth not leſs than fifty feet; thirty guineas.

CERTIFICATES of the performance of the Machine, and a Model of it, on a ſcale of not leſs than one inch to a foot, to be produced to the Society, on or before the firſt Tueſday in February, 1789.

185. MACHINE FOR CLEARING RIVERS. For the beſt Model of a Machine ſuperior to any now in uſe, for clearing

clearing Navigable Rivers from Weeds, at the leaſt expenſe; ten guineas.

To be produced to the Society, on or before the firſt Tueſday in February, 1789.

186. SECURING BUILDINGS FROM FIRE. To the Perſon who ſhall produce to the Society, the moſt ſpeedy and effectual method of extinguiſhing Fires in Houſes or other Buildings, ſuperior to any hitherto known or in uſe; the gold medal, or thirty guineas.

To be produced on or before the ſecond Tueſday in February, 1789.

Premiums

Premiums offered for the Advantage of the Britiſh Colonies.

187. NUTMEGS. For the greateſt quantity of merchantable Nutmegs, not leſs than five pounds weight, being the growth of his Majeſty's dominions in the Weſt Indies, and equal to thoſe imported from the Iſlands of the Eaſt Indies; the gold medal, or one hundred pounds.

Satisfactory Certificates from the Governor, Lieutenant-governor, Preſident of the Council, or Speaker of the Houſe of Aſſembly, of the place of growth, with an account of the number of trees, their age, nearly the quantity of fruit on each tree, and the manner of culture, to be produced on or before the firſt Tueſday in December, 1789.

188. The

188. The ſame Premium is extended one year further.

CERTIFICATES to be produced on or before the ſecond Tueſday in December, 1790.

N. B. Any Perſon deſirous of information on the ſubject of Nutmeg-trees, may obtain it from a Memorial on the fructification of the Nutmeg, and the ſureſt method of cultivating it to advantage, by the King's Gardener, at the Iſle of Bourbon, inſerted in Mr Maty's Review, for Auguſt, 1783.

189, 190. BREAD FRUIT TREE. To the Perſon or Perſons who, between the firſt of June, and the fifteenth of Auguſt, 1788, ſhall bring into the Port of London the greateſt number of Plants, of one or both ſpecies of the Bread Fruit Tree,

Tree, in a growing ſtate, not leſs than three of either ſpecies; the gold medal.

N. B. The Plants which obtain the Premiums are to be the property of the Society, to be diſpoſed of according to their diſcretion.

191. BREAD FRUIT TREE. To the Perſon who in the year 1789, ſhall convey from the Iſlands of the South Sea, to any of the Iſlands in the Weſt Indies ſubject to the Crown of Great Britain, the greateſt number not fewer than ſix, of one or both ſpecies of the Bread-fruit Tree in a growing ſtate; the gold medal.

CERTIFICATES, ſigned by the Governor, or Lieutenant-governor of the Iſland, of the importation of the trees, and of the ſtate they were in at the time of ſigning ſuch Certificates, to be delivered to the Society,

Society, on or before the ſecond Tueſday in October, 1790.

192. The ſame Premium is ext[illegible] one year further.

CERTIFICATES to be produced on or before the ſecond Tueſday in October, 1791.

THE SOCIETY being informed that a conſiderable quantity of Oil can be obtained from the Seed of Cotton, and that after the expreſſion of the Oil, the remaining Cake will afford a ſtrong and hearty Food for Cattle; and likewiſe, that the apparatus for the operation can be applied to the Mill for Sugar Canes, and worked in the rainy ſeaſon, at a moderate expenſe, have reſolved, for the foregoing reaſons, that the procuring Oil from the Seed of Cotton, is a proper object of

a Premium, conſidered as an encouragement for Planters to extend the cultivation of Cotton, an article eſſentially requiſite to encreaſe the manufacture of that commodity in this Country.

The Society therefore offer as follows:

193. OIL FROM COTTON SEED.

To the Planter in any of the Britiſh Iſlands of the Weſt Indies, who ſhall expreſs Oil from the ſeed of Cotton, and make from the remaining ſeed, hard and dry Cakes, as Food for Cattle; the gold medal.

CERTIFICATES that no leſs than one ton of the Oil has been expreſſed, and five hundred weight of the Cakes obtained, to be produced to the Society, with two gallons of the Oil, and two dozen of the Cakes, together with a full account of

of the proceſs, on or before the laſt Tueſday in November, 1788.

194. For the next greateſt quantity not leſs than half a ton of Oil, and two dozen of the Cakes; the ſilver medal.

195, 196. The ſame Premiums are extended one year further.

CERTIFICATES and Samples to be produced on or before the laſt Tueſday in November, 1789.

197. SPIRIT FROM THE PULP OF THE COFFEE BERRY. To the Planter in any of the Britiſh Iſlands in the Weſt Indies, who ſhall diſtil the greateſt quantity of Spirit, from the Pulp of the Coffee Berry, not leſs than thirty gallons, and produce to the Society, one gallon of the Spirit, together with an account

count of the proceſs uſed in the making it; the gold medal.

198. For the next greateſt quantity not leſs than fifteen gallons; the ſilver medal.

CERTIFICATES ſigned by the Governor, Lieutenant-governor, or ſome perſons of known credit in the iſland, to be delivered to the Society, on or before the firſt Tueſday in January, 1789.

199. SENNA. To the Perſon who ſhall import into the Port of London, in the year 1788, the greateſt quantity of Senna, not leſs than two hundred weight, the growth of any of the Britiſh Iſlands in the Weſt Indies, and equal to the ALEXANDRIAN SENNA, now uſed for medicinal purpoſes; the gold medal.

CERTIFICATES of the growth and method of culture, to be produced to the Society, on or before the firſt Tueſday in February, 1789.

200. The ſame Premium is extended one year further.

CERTIFICATES to be produced on or before the firſt Tueſday in February, 1790.

201. KALI FOR BARILLA. To the Perſon who ſhall cultivate in the Bahama Iſlands, or any other part of his Majeſty's Dominions in the Weſt Indies, in the year 1788, the greateſt quantity of land, not leſs than five acres, with Spaniſh Kali, fit for the purpoſe of making Barilla; the gold medal.

202. For the next greateſt quantity, not leſs than three acres; the ſilver medal.

CER-

CERTIFICATES ſigned by the Governor, Lieutenant-governor, or other chief Magiſtrate, of the quantity of land ſo cultivated, and of the ſtate of the Plants at the time of ſigning ſuch Certificates, to be delivered to the Society, on or before the ſecond Tueſday in November, 1789.

203. The ſame Premium is extended one year further.

CERTIFICATES to be delivered on or before the ſecond Tueſday in November, 1790.

204. CASHEW GUM. To the Perſon who in the year 1789, ſhall import into the Port of London, from any of the Britiſh Iſlands in the Weſt Indies, the greateſt quantity not leſs than half a ton, of the Gum of the Caſhew Tree, which on trial has been found to anſwer the purpoſe of Gum Senegal, in Calicoe-

printing, Silk-dying, &c. the gold medal, or thirty guineas.

A Sample not leſs than twenty pounds weight, and Certificates that the whole quantity is of the ſame quality and free from leaves and dirt, to be produced to the Society, on or before the ſecond Tueſday in January, 1790.

205. The ſame Premium is extended one year further.

CERTIFICATES and Samples to be produced on or before the ſecond Tueſday in January, 1791.

Society's

Society's Office, Adelphi, May 24, 1788.

Ordered,

THAT THE SEVERAL CANDIDATES AND CLAIMANTS TO WHOM THE SOCIETY SHALL ADJUDGE PREMIUMS OR BOUNTIES, DO ATTEND AT THE SOCIETY'S OFFICE IN THE ADELPHI, ON THE LAST TUESDAY IN MAY, 1789, AT TWELVE O'CLOCK AT NOON, TO RECEIVE THE SAME; THAT DAY BEING APPOINTED BY THE SOCIETY FOR THE DISTRIBUTION OF THEIR REWARDS: AND BEFORE THAT TIME, NO PREMIUM OR BOUNTY WILL BE DELIVERED, EXCEPTING TO THOSE WHO ARE OUT OF THE KINGDOM, OR PREVENTED BY UNAVOIDABLE ACCIDENTS.

IN CASES WHERE PERSONAL ATTENDANCE CANNOT BE GIVEN, DEPUTIES MAY BE SUBSTITUTED TO RECEIVE THE REWARDS.

GENERAL CONDITIONS.

Notwithſtanding the Society reſerve to themſelves the power of giving, in all Caſes, ſuch part only of any Premium as the Performance ſhall be adjudged to deſerve, or of withholding the whole, if there be no merit; yet the Candidates may be aſſured, the Society will always judge liberally of their ſeveral Claims.

It is required, that the Matters for which Premiums are offered, be delivered in without names or any intimation to whom they belong; that each particular thing be marked in what manner each Claimant thinks fit, ſuch Claimant ſending with it a paper ſealed up, having on the outſide a correſponding mark, and on the inſide, the Claimant's name and addreſs.

No

No Papers ſhall be opened, but ſuch as ſhall gain Premiums, unleſs where it appears to the Society abſolutely neceſſary for the determination of the Claim; all the reſt ſhall be returned unopened, with the Matters to which they belong, if inquired after by their Marks, within two years; after which time, if not demanded, they ſhall be publickly burnt unopened at ſome meeting of the Society.

All Models of Machines, which obtain Premiums or Bounties, ſhall be the property of the Society.

All the Premiums of this Society are deſigned for that part of Great Britain, called England, the dominion of Wales, and the town of Berwick upon Tweed, unleſs expreſsly mentioned to the contrary.

The Claims ſhall be determined as ſoon as poſſible after the delivery of the Specimens.

No Perſon ſhall receive any Premium, Bounty or Encouragement, from the Society, for any Matter for which he has obtained, or propoſes to obtain a Patent.

A Candidate for a Premium, or a Perſon applying for a Bounty, being detected in any diſengenuous method to impoſe on the Society, ſhall forfeit ſuch Premium or Bounty, and be deemed incapable of obtaining any for the future.

The Performances which each year obtain Premiums or Bounties, are to remain with the Society, until the end of May, except as mentioned in the Conditions annexed to the Premiums offered for promoting the Polite Arts.

No Member of this Society, ſhall be a Candidate for, or entitled to receive any Premium, Bounty, or Reward whatſoever, except the Honorary Medal of the Society.

Where

Where Certificates are required to be produced in claim of Premiums, they ſhould be expreſſed as nearly as poſſible in the words of the reſpective advertiſements, and ſhould not be from the Candidate, (ſolely) but from ſome other perſon, or perſons, who have a poſitive knowledge of the facts certified.

Where Premiums or Bounties are obtained, in conſequence of ſpecimens produced, the Society mean to retain ſuch part of thoſe ſpecimens as they may judge neceſſary, making a reaſonable allowance for the ſame.

No Candidate ſhall be preſent at any meetings of the Society or Committees, or admitted at the Society's Rooms, after they have delivered in their Claims, until ſuch Claims are adjudged, unleſs ſummoned by the Committee.

N. B. Any

N B. Any information or advice that may forward the deſigns of this Society for the public good, will be received thankfully, and duly conſidered, if communicated by letter, addreſſed to the Society, and directed to Mr. More, the Secretary, at the Society's office, in the Adelphi Buildings, London.

*** In caſe any Perſon ſhould be inclinable to leave a ſum of money to this Society, by will, the following form is offered for that purpoſe:

Item. I give and bequeath unto A. B. and C. D. the ſum of upon condition and to the intent, that they or one

one of them, do pay the ſame to the Collector for the time being, of a Society in London, who now call themſelves the Society for the Encouragement of Arts, Manufactures and Commerce; which ſaid ſum of I will and deſire may be paid out of my perſonal eſtate, and applied towards the carrying on the laudable deſigns of the Society.

By order of the Society,

SAMUEL MORE, Secretary.

A LIST

A

L I S T

OF

CONTRIBUTING MEMBERS.

N. B. Thoſe marked with ** pay five Guineas annually ; thoſe marked with * Three Guineas annually, thoſe with P are Perpetual Members, thoſe with †† have ſerved the Office of Steward, and thoſe with † are Stewards elect.

A.

** ABERCORN, James Earl of
Aileſbury, Thomas Earl of
Affleck, Admiral Sir Edmund Bart, M. P.
†† Andrews, Sir Joſeph Bart. *Shaw, Berks*
Arden, Right Honourable Sir Richard Peppar M. P. Maſter of the Rolls
Arkwright, Sir Richard *Crumford, Derbyſhire*
Abbott, Mr Andrew, *Fleet-ſtreet*
Abbot, Lemuel Francis Eſq. *Caroline-ſtr. Bloomſbury*

Adair,

Abdy, Rev. Thomas *Cooper-ſale, Eſſex*

Adair, Alexander Eſq, *Pall-mall*

Adamſon, Mr David *Oxford-road*

Adam, James, Eſq. *Albemarle-ſtreet*

Adam, Robert Eſq. F. R. and A. S. *Ditto*

Adam, William Eſq. *Ditto*

Addington, William Eſq. *Clarges-ſtreet, Piccadilly*

Affleck, Admiral Phillip *Wimpole-ſtreet, Cavendiſh-ſquare*

Affleck, Captain William *Ditto*

Agace, Mr Daniel *Goldſmith-ſtreet, Cheapſide*

Aguilar Honourable Ephraim Baron, *Broad-ſtreet, Buildings*

P Alexander, Claud Eſq.

†† Allen, John Eſq. *Clements-Inn*

† Allen, William Eſq. *Southampton-row*

Almack, William Eſq.

Anderſon, David Eſq. *York-ſtreet, St. James's-ſquare*

Angerſtein, John Julius Eſq. *Pall-Mall*

P Anneſly, Honourable Richard, Eſq. *Dublin*

Anſell, Mr James *Craig's Court, Charing-croſs*

P Antrobus, Edmund Eſq. *New-ſtreet, Spring-gardens*

Armſtrong, Mr Moſtyn John *Norwich*

Arrow, Mr James *Rocheſter-row, Weſtminſter*

Artaud, Mr William *Ruſſel-ſtreet, Covent-garden*

P Aſhby, Shukbrugh Eſq, F.R.S. *Great Ormond-ſtreet*

Aſhton,

Aſhton, Mr Iſaac *Arundel-ſtreet*

Aſſer, Mr James,

P Aubert, Alexander Eſq, F.R. and A.S. *Auſtin-friars*

Auriol, Mr James *Chancery-lane*

Auſtin, William M. D. *Cecil-ſtreet, Strand*

B.

P Bute, John Earl of

P Buchan, David Earl of L.L.D. F.R. and A.S.

Briſtol, Right Rev. Frederick Earl of F.R.S.

Balgonie, Lord

P Barrington, Honourable Daines, F. R. and A.S. *Temple*

Bruhl, His Excellency Count De *Dover-ſtreet*

Berchtold, Honourable Count *Prague in Bohemia*

P Blackett, Sir Thomas Bart.

Blacket, Sir Edward, Bart. F.A.S. *Clarges-ſtreet*

Bridgeman, Sir Henry Bart. M.P. *St James's-ſquare*

Bridger, Sir John *Combe, Suſſex*

Bacon, John Eſq. R.A. *Newman-ſtreet*

†† Bacon, John Eſq. F.A.S. *Temple*

Baker, John Eſq. *Princes-ſtreet, Spitalfields*

Baker, Mr John *Saliſbury-ſquare, Fleet-ſtreet*

Bancroft, Edward M.D. and F.R.S. *Charlotte-ſtreet*

P Barclay, David Eſq. *Red-lion-ſquare*

Baring, Francis Eſq. M.P. *Mincing-lane*

Baring,

Baring, John Eſq. M.P. *Ditto*

Baratty, Simon Eſq. *Gracechurch-ſtreet*

P Barnard, Mr William *Deptford*

Barnard, Mr Thomas *Adelphi*

Barret, Mr Bryant *Strand*

Barron, Mr Thomas *Saliſbury-ſtreet, Strand*

Bartolozzi, Francis Eſq. R.A. *North-end*

Baſtard, John P. Eſq. M.P. *Portland-place*

Bates, John Eſq. *Wycombe-marſh, Bucks*

Batſon, Robert Eſq. *Limehouſe*

Baverſtock, Mr James *Windſor*

Bax, John Eſq. *New Broad-ſtreet, City*

Bayley, Mr John *High-ſtreet, Mary-le-bone*

Baynes, Mr. John *Blackfriars-bridge*

Bean, Alexander Eſq. *Drury-lane*

†† Beard, John Eſq. *Doctors Commons*

* Beaufoy, Henry Eſq. M.P. F.R.S. *Great George-ſtreet, Weſtminſter*

Bell, William Eſq. *Guernſey*

Bent, Ellis Eſq. *Warrington*

Bennett, James Eſq jun. *Finchurch-ſtreet*

Beth, Thomas Eſq. *Elm-court, Temple*

Betteſworth, Thomas Eſq. *Mark-lane*

Birkhead, Charles Eſq. *Riegate, Surry*

Biſhop, Nathaniel Eſq. *Bedford-ſquare*

Blades, Mr John *Ludgate-hill*

Blackburn,

Blackburne, John Eſq. M. P. *Park-ſtreet, Weſtminſter*

Blake, Mr William *Alderſgate-ſtreet*

Bland, John Eſq. *Lombard-ſtreet*

Blane, Gilbert, M.D. and F.R.S. *Sackville-ſtreet*

Blizard, Mr William F.R. and A.S. *Lime-ſtreet*

† Blofeld, Thomas Eſq. *Serjeants-Inn, Fleet-ſtreet*

Bloxam, Matthew Eſq. Sheriff for the County of Middleſex, *Soho-ſquare*

P Boehm, Edmund Eſq. *Siſe-lane*

Bond, Mr William *Narrow-wall, New-Road, Surry*

Bontein, Captain James *Little Tower-hill*

* Bootle, Richard Wilbraham, Eſq. M.P. F R.S. *Bloomſbury-ſquare*

Boulton, Matthew Eſq. F.R.S. *Soho, near Birmingham*

P Bowdoin, James Eſq.

†† Boydell, John Eſq. and Alderman *Cheapſide*

Bramſton, Thomas Berney Eſq. M. P. *Albemarle-ſtreet*

Bramah, Mr Joſeph *Piccadilly*

Braithwaite, Daniel Eſq. F.R. and A.S. *Poſt-Office*

Brand, Thomas Eſq. *Soho-ſquare*

Bridges, Kemp jun. Eſq. *Charlotte-ſtreet, Rathbone-place*

* Brereton, Owen Salusbury Esq. V.P. F.R, and A.S. *Soho-square*

Brehm, Major Diederick *South-molton-street*

Brickwood, Mr Nathaniel, *Castle-street, Thames-street*

P Broadhead, Theodore Henry Esq. *Portland-place*

Brown, Mr John *Holborn*

Brown, Mr Joseph *George yard, Lombard-street*

Browne, Isaac Hawkins Esq. M.P. F.R.S.

Browne, Mr Robert *King's Mews*

Brownlie, John M.D. *Carey-street, Lincoln's-Inn*

Brudenell, George Bridges Esq. M.P. *Great George-street, Westminster*

Brummell, William Esq. *Charles-street, Berkley-square*

Bryer, William Esq. *Newman-street*

Bucknall, Thomas Skip Esq. *Conduit-street*

Bulcock, Mr William *Abroad*

Burgess, James Bland Esq. M.P. *Fludyer-street*

Bureau, Mr Daniel *Walbrook*

Bullock, Thomas Esq. *Pall-mall*

Burney, Mr John *Star-court, Bread-street*

Burrow, Mr Reuben *East-Indies*

Butts, Mr John *Fleet-street*

Pyfield, Mr George *Manchester-buildings*

P Gardiff,

C.

P Cardiff, John Lord F.A.S.

P Carmarthen, Francis Marquis of F.R. and A.S.

** Chaulnes, Monſieur Le Duc De *Paris*

** Cavendiſh, Lord George

Compton, Lord M.P.

** Courtenay, William Lord Viſcount

Cremorne, Thomas Lord Viſcount

P Conway, Right Honourable General Henry Seymour M.P.

Cavendiſh, Honourable Henry F.R. and A.S. *Gower-ſtreet, Bedford-ſquare*

Cadell, Mr Thomas *Strand*

Calverley, Thomas Eſq. *Ewell, Surry*

Cameron, Donald Eſq. *Walbrook*

Campbell, Major General Archibald

Campbell, Duncan Eſq. *Adelphi*

Chambers, Chriſtopher Eſq. *Mincing-lane*

Carew, Reginald Pole Eſq. M. P. *Charles-ſtreet, Berkley-ſquare*

Cazalet, Peter Eſq. *Auſtin-friars*

Carpenter, Mr Henry *Panton-ſtreet, Hay-market*

Chandler, Henry John Eſq. *Bentinck-ſtreet*

Changeux, Monſieur Pierre Jacques *Paris*

Charrington, John Eſq. *Mile-end*

Chiſwell, Richard Muilman Trench, Eſq. *Portland-place*

Claggett, Charles Eſq. St. *Alban's-ſtreet, Pall-mall*

†† Clarke, Richard Eſq. Alderman, *Bridge-ſtreet, Blackfriars*

Clarke, Mr Henry *Broad-ſtreet*

Clarke, Mr Henry *Gracechurch-ſtreet*

P Clark, Mr James

Clark, Richard Eſq. *Aldermanbury*

Cloſe, Rev. Henry John *Ipſwich*

Coghill, John Eſq. *Coghill-hall, Yorkſhire*

Colborne, Thomas Eſq. *Queen Ann-ſtreet, Weſt*

Cole, Mr Martin *Channel-row, Weſtminſter*

P Colepepper, John Spencer Eſq.

†† Collins, Thomas Eſq. *Berners-ſtreet*

Collins, Mr William *Lambeth*

Colliſon, Mr John

Collinſon, Thomas Eſq.

Combrune, Gideon Eſq. *Suffolk-ſtreet, Middleſex-Hoſpital*

Compton, Mr Henry *Charlotte-ſtreet, Pimlico*

†† Conant, Nathaniel Eſq. *Lamb's-conduit-ſtreet*

Coney, William Eſq. *Oriel College*

P Coningham, James Eſq. *Pancras-lane, Queen-ſtreet, Cheapſide*

Cooke,

Cooke, Benjamin Mus. D. *Dorſet-court, Weſtminſter*

Cooke, Rev. Mr James *Heaton-Norris, near Manchester*

Cook, Major William *Ormond-ſtreet*

P Cooper, Mr John *Portpool-ſtreet*

Cooper, Mr Benjamin *Clements-lane, Lombard-ſtreet*

Cope, William Eſq. *Sanctuary, Weſtminſter*

Copeley, Thomas Eſq. *Netherhall, near Doncaſter, Yorkſhire*

P Coppens, B. M.D. *Ghent, Flanders*

Cort, Henry Eſq. *Goſport*

Cotton, Charles Eſq. *Maddingly, Cambridgeſhire*

Coulſon, Jukes Eſq. *Thames-ſtreet*

Couſſmaker, Lannoy Richard Eſq. *Warnford-court*

Craddock, Joſeph Eſq. *Grumley, Leiceſterſhire*

Cranke, Mr William *Biſhopſgate-ſtreet*

Crathorne, Henry Ralph Eſq. *Yorkſhire*

Crawſhay, Richard Eſq. *George-yard, Thames-ſtreet*

Crawley, Samuel Eſq. *Argyle-ſtreet*

Crawley, Mr William *Biſhopſgate-ſtreet*

Creak, Mr William *Cornhill*

Crewze, Francis Eſq. *Lowlayton, Eſſex*

Criſp, John Eſq. *John-ſtreet, Adelphi*

Croft, Richard jun. Eſq. *Pall-mall*

Cropley, Rev. William *Weſt Ham*

Crowcher, John Eſq. *Denſworth, near Colcheſter*

Crowder, William Henry Eſq. *Frederick's-place, Old jewry*

D.

**Devonſhire, William Duke of

**Dartmouth, William Earl of F.R.S.

P Dolben, Sir William Bart. V.P. M.P. *Duke-ſtreet, Weſtminſter*

Dagge, Henry Eſq. F. R. S. *Great Ruſſel-ſtreet, Bloomſbury*

Dancer, Mr John *Doncaſter*

Daniell, James Eſq. *Welbeck-ſtreet*

Darch, Lieut. Col. Thomas, *Gower-ſtreet, Bedford-ſquare*

†† Davenport, John, Eſq. *Taviſtock-ſtreet, Covent-garden*

Davenport, Richard Eſq. *Paul's Wharf*

* Daviſon, James Eſq. V.P. *Charles-ſtreet, Cavendiſh-ſquare*

D'Aubant, Lieut. Col. Abraham, F.A.S. *Wimpole-ſtreet*

Dehany, Phillip Eſq. *Queen-Ann-ſt. Cavendiſh-ſquare*

† Delamain, John Eſq. *Margaret-ſtreet, Ditto.*

Delafield,

Delafield, Joſeph Eſq. *Caſtle-ſtreet, Long-Acre*
Dent, Robert Eſq. *Temple-bar*
De Sauſeuil, le Chevalier *Paradiſe-row, Chelſea*
Deſanges, Mr William *Wheeler-ſtreet, Spitalfields*
Deſenfans, Noel Eſq. *Charlotte-ſtreet, Portland-place*
Deſbarres, Joſeph Frederick Wallet Eſq. *Abroad*
Deformeaux, Mr James Lewis, *Pearl-ſtreet, Spitalfields*
Deval, Mr John, *Portland-ſtreet*
Devaynes, John Eſq. *Spring-gardens*
Dickinſon, Charles Eſq. *Abroad*
Dickinſon, Mr William, *Old-Bond-ſtreet*
Dobbyn, Hannibal, Eſq. *Suffolk-ſtreet, Charing-croſs*
Dodſley, Mr James *Pall-mall*
Dolben, John Engliſh Eſq. F.A.S.
Dollond, Mr Peter St. *Paul's Church-yard*
Dollond, Mr John *Ditto*
Dorſett, George Eſq. *New Bond-ſtreet*
Douce, Thomas Auguſtus Eſq *Townmaling, Kent*
Douglas, Captain Peter *Abroad*
Dowden, Mr John *Alton, Hants*
†† Dower, Robert Eſq. *Middle Temple*
Downman, John Eſq. *Leiceſter-fields*
Drake, George Eſq. *Bedford-ſquare*
Drake, Mr Samuel *Margaret-ſtreet, Weſtminſter*
Draper, Mr John, *Maze-pond, Southwark*

Drew,

Drew, Mr Thomas *Charlottee ſtreet, Portland-place*

P Dreyer, Mr Maurice

Duberly, James Eſq. *Piazza, Covent-garden*

Dubourg, Mr Richard *Duke-ſtreet, Manchester-ſquare*

Dubufe, Mr Claude *Vincennes* near *Paris*

Dunn, Samuel Eſq. *Adelphi*

Dunn, Mr Edward *Mount-ſtreet, Groſvenor-ſquare*

P Duroure, Lieutenant Colonel F.R. and A.S. *Old Burlington-ſtreet*

Duval, Mr John Peter *Hackney*

E.

P Effingham, Thomas Earl of

P Egremont, George Wyndham Earl of

Earle, Henry Eſq. *Temple*

Eaton, Rev. Stephen St. *Ann's Soho*

P Eaton, Peter Eſq. *Weſtford, Eſſex*

Eaton, Richard Eſq. *Lincoln's Inn*

P Eckerſall, John Eſq. *Burford-houſe* near *Dorking, Surry*

Edgworth, Richard Lovell, Eſq. F.R.S.

Edwards, George Eſq. *Barnard-caſtle*

Edwards, Mr Samuel *Stamford, Lincolnſhire*

P Egan, James, L.L.D. *Royal-park Academy, Greenwich*

P Ellott,

P Ellicott, Mr Edward *Royal Exchange*
Ellill, John Eſq. *Queen-ſtreet, Cheapſide*
Elmſly, John Eſq. *Oriel College*
P Errington, John Eſq. *Hill-ſtreet*
Errington, George Eſq.
Evans, Mr John *Pope's Head Alley*
Evans, Morgan Eſq. *Lincoln's Inn*
*††Ewer, Samuel Eſq. *Lincoln's-inn-fields*

F.

Fife, James Earl of M.P. F.R. and A.S.
P Fitzwilliam, Richard Lord Viſcount F.R.S.
* Fludyer, Sir Samuel Bart. *Downing-ſtreet*
Finch, Honourable Captain William *Albury* near *Guildford*
P Fletcher, Sir Henry Bart- M.P. *Southampton-row, Bloomſbury*
Fordyce, Sir William Kt. F.R.S. *George-ſtreet, Hanover-ſquare*
Farmer, Samuel Eſq. *Beckenham, Kent*
P Felton, Samuel Eſq. F.R. and A.S. *Charlotte-ſtreet, Portland-place*
Fentham, Mr, Thomas *Strand*
P Fermor, William Eſq. *South-ſtreet*
Feuilleteau, William Eſq. F.A.S. *Brompton*

Finlay,

Finlay, Andrew Eſq. *Middle-temple*
Fludyer, George Eſq. M. P. *Downing-ſtreet*
Fowler, David Burton Eſq. *Figtree-court, Temple*
Fordyce, Alexander Eſq.
Fordyce, George M. D. F. R. S. *Eſſex-ſtreet, Strand*
Francis, Phillip Eſq. M. P. *Harley-ſtreet*
Frankland, William Eſq. *Cavendiſh-ſquare*
Frankland, William Eſq. *Gray's-inn*
Frankland, Roger Eſq. *Chriſtchurch-college, Oxford*
Franks, William Eſq. F. R. S. *Percy-ſtreet, Rathbone-place*

P Franklin, Benjamin L. L. D. F. R. and A. S.
Fraſer, Robert Eſq.
Freeman, Stephen M. D. *Hatton-ſtreet*
Frend, Mr George *Abroad*
Fuller, William Eſq. *New-road, Southwark*

G.

* Groſvenor, Richard Earl, F. R. S.
P Gallway, Arundell Lord Viſcount, M. P. and K. B.
P Greville, Right Honourable Charles M. P. F. R. S.
Grey, Sir Henry Bart. *Howick, Northumberland*
Gibbs, Sir Phillip Bart. *Barbadoes*
Green, Major General Sir William Bart.
Gape, Joſeph Eſq. *Bridge-ſtreet, Weſtminſter*

P Gauſſen

P Gauſſen, Mr Peter *Little St Helens*

Geary, William Eſq. *Oxen-heath, Kent*

Gell, Anthony Eſq. *North-ſtreet, Weſtminſter*

Giſborne, Thomas M. D. F. R. S. *Clifford-ſtreet*

Glenny, George Eſq. *Bromley-hill, Kent*

P Godſchall, William Man Eſq. F. R. and A. S.

Goldthwaite, Thomas Jun. Eſq. *Walthamſtow*

Goſling, Robert Eſq. *Fleet-ſtreet*

Goſling, Francis Eſq. *ditto*

Grant, Major John *Portman-ſquare*

††*Green, Valentine Eſq. F. A. S. *Newman-ſtreet*

P Green, Mr Rupert *Newman-ſtreet*

Green, Mr William *Croydon*

Greenwood, Abraham Eſq. *Steining-lane*

P Gregory, Robert Eſq. *Berners-ſtreet*

Grews, Robert Eſq. *Store-ſtreet, Bedford-ſquare*

Grey, Edward Eſq. *Oxford-ſtreet*

Gower, Charles Eſq. *Oriel-college, Oxford*

Gregory, Mr Henry *Leadenhall-ſtreet*

Greſley, Reverend William

P Griffith, Edward Eſq. of *Carnarvon*

Grigby, Joſhua Eſq. M. P. *Drinkwater*, near *Bury, Suffolk*

Grignion, Mr Thomas *Ruſſel-ſtreet, Covent-garden*

Grote, Andrew Eſq. *Threadneedle-ſtreet*

Groſvenor, Richard Eſq. *Berkley-ſtreet, Mancheſter-ſquare*

Groves

Groves, John Eſq. *Millbank*

† Grubb, John Eſq. *Lincoln's-inn-fields*

Gullet, Chriſtopher Eſq. *Exeter*

H

**Hardwicke, Phillip Earl of F. R. and A. S.

P Hilſborough, Wills Earl of F. R. S.

Hereford, George Lord Viſcount

Hawke, Martin Lord

Howard, John Lord, K. B.

F**Heathfield, George Auguſtus Lord, K. B. V. P.

Haſlang, His Excellency Count

P Hume, Sir Abraham Bart. F. R. S. *Wormleybury*

Harcourt, Honourable General William

Hanmer, Sir Thomas Bart. *Hanmer, Flintſhire*

Harley, Right Honourable Thomas Alderman. M. P. *Alderſgate-ſtreet*

Hache, William Eſq. *Jewry-ſtreet*

P Hagen, Mr Jacob *Walworth*

Haite, James Eſq. *Walton, Surry*

Hale, William Eſq. *Groſvenor-place*

Hall, Mr Abraham *Aldermanbury*

Hall, John Eſq. *Berwick-ſtreet, Soho*

Hall, Mr Nathaniel *Parliament-ſtreet*

Hall, Mr Sylvanus, *Paternoſter-row*

Hamilton

Hamilton, Reverend Anthony D. D. F. R. and A.S. *Leiceſter-fields*

††Hamond, William Parker Eſq. *Berners-ſtreet*

Hankey, Richard Eſq. *Fenchurch-ſtreet*

Hankey, John Eſq. *Mincing-lane*

Hanmer, Edward Eſq. *Sampſon-place, Bucks*

Harborne, Richard Eſq. *John-ſtreet, Adelphi*

Harman, Mr Jeremiah *Princes-ſtreet, Lothbury*

Harris, John Eſq. *Newington-butts*

* Haſtings, Warren Eſq. *St James's-place*

Hawes, Francis Eſq. *Reading, Berks*

Hawkins, Chriſtopher Eſq. M. P.

Hayter, Mr Jonathan, *King-ſtreet, Cheapſide*

Hayward, Mr Richard *Piccadilly*

Haywood, Mr James *Walton, on Thames*

††Heaviſide, Richard Eſq. *Temple*

P††Hebert, James Eſq. *Great Portland-ſtreet*

Hele, John Eſq. *Charlotte-ſtreet, Rathbone-place*

Hemming, Mr John *Bearbinder-lane*

Hemming, John M.D. *King-ſtreet, Golden-ſquare*

Henderſon, Chriſtopher Eſq. *Robert-ſtreet, Adelphi*

Herne, Mr Thomas *Highgate*

Herne, Mr William *Paternoſter-row*

* Hewett, John Eſq.

Hewlett, Mr William *Strand*

Higgins, Bryan M.D. *Greek-ſtreet, Soho*

Hilliard

Hilliard, Edward Eſq. *Lincoln's Inn*

Hilton, John Eſq. *Lawrence-lane, Cheapſide*

Hincks, Mr William, *Mortimer-ſtreet, Cavendiſh-ſquare*

Hindle, John Eſq. *Tufton-ſtreet, Weſtminſter*

Hinde, Robert Eſq. *Lincoln's Inn*

Hodſkinſon, Mr Joſeph *Arundel-ſtreet*

Hodges, William, Eſq. *Queen-ſtreet, May-fair*

Hodgſon, Samuel Eſq. *Howland-ſtreet, Rathbone-place*

Hodgſon, Mr John *Vauxhall*

Hodſoll, Edward Eſq. *Strand*

Holland, Mr Richard, *Half-Moon-ſtreet, Piccadilly*

Holland, Mr Henry *Hertford-ſtreet, May-fair*

Hollis, Thomas Brand Eſq. F.R. and A.S.

Hollis, Timothy Eſq. *Great Ormond-ſtreet*

Holliday, John Eſq. F.R.S. *Ditto*

Honeybourne, Mr Robert *Stourbridge*

Honywood, Filmer Eſq. M.P. *Charles-ſtreet, Berkley-ſquare*

* Hooper, Edward Eſq. V.P. F.R.S. *Hertford-ſtreet*

Hooper, Mr Samuel *Holborn*

† Hopkins, Benjamin Bond, Eſq. M.P. *Wimbleton*

Horton, Mr William, *Newgate-ſtreet*

* Houlton, Jacob jun. Eſq.

Houghton, William Eſq.

Houldſworth,

Houlditch, Mr Edward *Long-acre*
Houlſton, Mr William F.A.S. *Chancery-lane*
P Howard, John Eſq. F.R.S. *Cardington, Bedfordſhire*
P Hudſon, Vanſittart Eſq. *Temple*
Hughes, Rev. Edward *Greenfield-hall, Flintſhire*
Hull, Chriſtopher Eſq. *Hare-court, Middle-temple*
Hulme, William Eſq. *Twydall, Kent*
Hunter, John Eſq. M.P. *Bedford-ſquare*
†† Hurlock, Joſeph Eſq. F.R.S. *John-ſtreet, Kings-road*
Hutchinſon, Samuel, Eſq.
Hyde, John Eſq. *New Bond-ſtreet*

I.

P Ilcheſter, Henry Thomas Earl of
† Ingilby, Sir John Bart. F.A.S.
Jones Sir William Bart. *Cavendiſh-ſquare*
Jackſon, Henry M.D. *Hanover-ſtreet, Hanover-ſquare*
Jacob, Mr Joſeph *Greek-ſtreet, Soho*
P Jamineau Iſaac Eſq.
Jardin, Mr John *Princes-ſtreet, Lothbury*
Jarman, Nathaniel Eſq.
Jeffery George Eſq. *Throgmorton-ſtreet*
P Jenkins, Thomas Eſq. *Rome*
Jenner, Mr Robert, *Doctors-commons*
Jervoiſe, Jervoiſe Clark, Eſq. M.P. *Hanover-ſquare*

Innes,

Innes, Albert, Eſq. *Duke-ſtreet, York-buildings*

* Johnes, Thomas Eſq. M.P.

Johnſon, Alexander L.L. and M.D. *Portland-ſtreet*

Johnſon, Mr Edward *Stepney-green*

†† Johnſon, John Eſq. *Charles-ſtreet, Middleſex-hoſpital*

Johnſon, John junr. Eſq. *Berners-ſtreet*

Johnſtone, Captain John *Inner Temple*

Jones, Edward Eſq. *Weprahall, Flintſhire*

Jones, Mr Francis *Groſvenor-ſtreet*

Jones, Robert M.D. *Sutton*, near *Hounſlow*

Jones, Mr Thomas *Fiſh-ſtreet-hill*

Jones, John Eſq. *Great James-ſtreet, Bedford-row*

K.

King, Peter Lord

Kaye, Rev. Richard Dean of Lincoln, L. L. D. F.R. and A.S.

Kappen, Mr William *Southampton-ſtreet, Strand*

P Keck, Anthony Eſq. *Twickenham*

Kendrick, Mr Edward *King-ſtreet, Covent-garden*

Kennett, Mr Benjamin junr. *Eſſex-ſtreet, Strand*

Kentiſh, Richard M.D. *Gower-ſtreet, Bedford-ſquare*

Keyſall, John Eſq. *Queen ſquare, Holborn*

P Kinleſide, William Eſq. *Paddington*

Kitchiner, William Eſq. *Beaufort-buildings*

Knill

Knill, John Eſq. *Gray's Inn*
Knox, William Eſq. *Soho-ſquare*

L.

* Leiceſter, George Earl of F.R. and A.S.
P Lovaine, Algernon Lord
* Landaff, Richard Lord Biſhop of F.R.S.
P Lewiſham, George Lord Viſcount F.R. and A.S.
Long, Sir James Tylney Bart. M.P. *Groſvenor-place*
P Laurent, Sir Francis Kt.
* Lewes, Sir Watkin Kt. V.P. M.P. *King's-road*
Lambert, Mr Charles *Temple*
La Manda, Mr John *Cockſpur-ſtreet, Charing-croſs*
Lawrence, Richard James Eſq. *Bulſtrode-ſtreet*
Leatham, Mr William *Chatham-ſquare, Blackfriars*
Leighton, William Eſq. *Charlton, Kent*
Lempriere, George Eſq. *Broad-ſtreet, City*
Lettſom, John Coakley M. D. F. R. and A. S. *Baſinghall-ſtreet*
Leverton, Thomas Eſq. *Great Queen-ſtreet*
Levy, Moſes Iſaac Eſq. F.A.S. *Lincoln's-inn-fields*
†† Lewis, John Eſq. *Queen Ann-ſtreet, Eaſt*
Lewis, Percival Eſq. *Lincoln's-inn*
Lewis, Iſrael Eſq. *Hampſtead*
Life, Mr Macey *Craven-ſtreet, Strand*
Lilly, Mr Thomas *Pancraſs-lane*

Linſell, Vaughan Eſq.

Lipſcrap, John Eſq. F.A.S. *Whitechapel-road*

* Lock, William Eſq. *Savile-row*

P Long, Samuel Eſq. *Bloomſbury-ſquare*

P Loveden, Edward Loveden Eſq. M.P. *Queen-ſquare, Holborn*

Lowndes, William Eſq. *Scotland-yard, Whitehall*

Lucas, Bartholomew Eſq. *Ludgate-hill*

Lumley, Mr William *Bell-yard, Temple-bar*

Lunardi, Vincent Eſq. *Poland-ſtreet*

M.

**Montagu, George Duke of V.P. K.G. F.R. and A.S.

**Manners, Lord James

Macdonald, Alexander Lord

Milford, Richard Lord M.P.

**Marſham, Honourable Charles V.P. M.P. F.R.S.

Murray, the Honourable General James M. P. F.R.S. *Beauport, Suſſex*

Mackworth, Sir Herbert Bart. V.P. M.P. F.R. and A.S. *Queen-Ann-ſtreet, Cavendiſh ſquare*

Mawbey, Sir Joſeph Bart. M.P. *Great George-ſtreet, Weſtminſter*

Middleton, Sir Charles Bart. M.P. *Hertford-ſtreet, May-fair*

Mr

Mc Pherſon, Sir John Bart. *Prompton-grove*
Macham, William L.L.D. *Doctor's-commons*
Mackay, Robert Eſq. *Queen-ſtreet, Cheapſide*
Mackreth, Mr Francis *Pall Mall-court*
Mackreth, Robert Eſq. M.P. *Cork-ſtreet*
Macmurdo, Mr Edward Longdon *Cheapſide*
P Macnamara, John Eſq. M.P. *Pall Mall*
Magellan, Mr John Hyacinth F.R.S. *Nevil's-court, Fetter-lane*
Malcolm, Mr William *Kennington*
Marſh, Mr William *South-ſtreet, Groſvenor-ſquare*
Maſkell, Mr Samuel *Mitre-court, Milk-ſtreet*
Martin, James Eſq. M.P. *Downing-ſtreet*
Martin, Mr John *Southampton*
Martyn, the Rev. Thomas B.D. and F.R.S. *Profeſſor of Botany, Cambridge*
Martyn, Thomas Eſq. *Great Malborough-ſtreet*
P Maſon, Rev. William *Curzon-ſtreet*
Matthew, Job Eſq. *Laytonſtone, Eſſex*
Matthews, Edward Eſq. *Tottenham-court-road*
Mayo, John M.D. *Southampton-row*
Meadows, Mr John *New Peter-ſtreet, Weſtminſter*
**Methuen, Paul Eſq. *Lower Groſvenor-ſtreet*
†† Meyrick, John Eſq. F.A.S. *Parliament-ſtreet*
Michie, Jonathan Eſq. *Craven-ſtreet, Strand*
Middleton, Mr John *Vauxhall-walk, Lambeth*

Millington, Langford Eſq. *Tooting*

Millington, Mr Thomas *George-ſtr. Hanover-ſquare*

Mills, Mr Benjamin *Middle Moorfields*

Milnes, Richard Slater Eſq. M.P. *Holles-ſtreet, Cavendiſh-ſquare*

Miniſh, Mr William *Whitechapel*

Monro, John M.D. F.R and A.S. *Bedford-ſquare*

Montolieu, Lewis Eſq. *Hanover-ſquare*

* Montagu, Mrs Elizabeth *Portman-ſquare*

Morris, Robert Eſq. *Swanſea, Glamorganſhire*

Morſe, Leonard Eſq. F.R.S. *Downing-ſtreet, Weſtminſter*

Mortimer, Thomas Eſq. *Bath*

Moſer, Mr John *Berwick-ſtreet*

P Muilman, Peter Eſq. *King-ſtreet, Covent-garden*

N.

P Norfolk, Charles Duke of F.R. and A.S.

**Northumberland, Hugh Duke of V.P. K.G. and F.R.S.

North, Frederick Lord K.G. and M.P.

Nairne, Mr Edward F.R.S. *Cornhill*

P Newton, Andrew Eſq. *Cecil-ſtreet, Strand*

Nicholas, Robert Eſq. M.P. *Aſhton Kryncs, Wilts.*

Nickalls, Mr Joſeph *Southwark*

Noireterre, Mademoiſelle De *Paris*

P Oſſory,

O.

P Oſſory, John Earl of Upper M.P. F.R.S.
Ogilvie, Scroope Eſq. *Pall Mall*
Ord, John Eſq. M.P. F.R.S. *Lincoln's-inn-fields*
P Oſwald, James Eſq. *Albermarle-ſtreet*
Owen, Rev. John *Laytonſtone, Eſſex*

P.

**Portland, William Henry Duke of F.R. and A.S.
P Plymouth, Otho, Earl of F.R.S.
* Puſey, Honourable Phillip *Upper Brook-ſtreet*
Pelham, Right Honourable Thomas M.P. *Stratton-ſtreet*
Palk, Sir Robert Bart. *Bruton-ſtreet*
* Pocock, Sir George K. B. Admiral of the Blue, *Charles-ſtreet, Berkley-ſquare*
P Paice, Mr Joſeph *Bread-ſtreet-hill*
Page, Francis Eſq. M.P. *Aſhton, Oxfordſhire*
Papworth, Mr. John *Wells-ſtreet, Oxford-ſtreet*
Pariſh, John Eſq. F.A.S. *Fludyer-ſtreet*
Parker, David Eſq.
† Parker, Mr Samuel *Earl-ſtreet, Blackfriars*
Parker, Mr William *Fleet-ſtreet*

Parkinſon, Mr Thomas *Store-ſtreet, Bedford-ſquare*

†PParkyns, Thomas Boothby, Eſq. M.P. F.R. and A.S. *Somerſet-ſtreet, Portman-ſquare*

Parnell, Benjamin Eſq. *Gray's-inn*

Parnell, Mr Hugh *Church-ſtreet, Spittalfields*

Parry, Mr Edward *Trinity-ſtreet, Rotherithe*

Parry, William Eſq. *Norton-hall, Wiltſhire*

Payne, Mr Samuel *Vauxhall*

Payne, Mr Thomas *Chriſt-church, Surry*

Pearſon, George M.D. *Leiceſter-fields*

Pearſon, James Eſq. *Baſinghall-ſtreet*

Pegge, Chriſtopher Eſq. A.B. *Chriſt-church, College*

Penn, Granville Eſq. *Downing-ſtreet, Weſtminſter*

P Perrin, William Phillip Eſq. F.R. and A.S. *Bloomſbury-ſquare*

Perry, John Eſq. *Blackwall*

Phillips, Mr Richard *Lincoln's-inn*

Phillips, Mr Samuel *St George's-road, Blackfriars-bridge*

P Pinfold, Charles Eſq. L.L.D.

Pitt, William Morton Eſq. M.P. *Arlington-ſtreet*

Pitt, Thomas Eſq. *Wimpole-ſtreet*

Pitcairn, David M.D. and F.R.S. *Lincoln's-inn-fields*

P Potter, Chriſtopher Eſq. *Leiceſter-fields*

Potter, George Eſq. *Charing-croſs*

Pourcin,

Pourcin, Mr Joſeph *Taviſtock-ſtreet*

Pownall, Lillingſton Eſq. *Burlington-ſtreet*

Powney, Henry Eſq. *Tooke's-court*

P Prado, Samuel Eſq.

Pratt, John Eſq. *Lower Brook-ſtreet*

Pugh, Mr David *Hereford*

Purcell, John Eſq.

R.

**Richmond, Charles Duke of V.P. K.G. F.R.S.

**Radnor Jacob Pleydell, Earl of V.P. F.R. and A.S.

**Romney, Robert Ld. Preſident L.L.D. F.R. & A.S.

P Rocheſter, John Lord Biſhop of

Rodney, George Bridges Lord K.B.

Ridley, ſir Mathew White Bart. M.P. *Portland-place*

Railton, Iſaac Eſq. *Cheapſide*

P Ramey, John Eſq. *Ormeſby, Norfolk*

Ramſbottom, John Eſq. *Alde ſgate-ſtreet*

† Ramſbottom, Richard Eſq. *Ditto*

Ramus, William Eſq. *St James's*

Rawlinſon, Abraham Eſq. M.P. *Lancaſter*

Reaſton, Francis Buſhel Eſq *Temple*

Reed, John Eſq. *Chipchaſe Caſtle, Hexham, Northumberland*

Reid, Mr John *Fan-ſtreet, Alderſgate ſtreet*

Reeves, Mr William *Strand*

Reeves, John Eſq. *Thanet-place, Strand*

Reynardſon, Samuel Eſq. F.R. and A.S. *Great Ormond-ſtreet*

Remmington, John Eſq. *Milk-ſtreet, Cheapſide*

Richardſon, William Eſq. *Vauxhall*

Rigg, John Jun. Eſq. *Mark-lane*

Riley, Mr John *Long-acre*

Roberts, William Eſq *Bennet-ſtreet, St James's*

Robertſon, Mr James *Fleet-ſtreet*

Robſon, Mr James *New Bond-ſtreet*

Robinſon, John Eſq. *Wellcloſe-ſquare*

Rodes, Cornelius Heathcote Eſq. *Ballerings Derbyſhire*

Rodney, James Eſq. *Soho-ſquare*

Rogers, Samuel Eſq. *Charlotte-ſtreet, Portland-place*

Rogers, Mr Thomas, *Southampton-row, Bloomſbury*

Rondeau, James Eſq. *Savage-gardens*

Roſs, Alexander, Eſq. *Golden-ſquare*

Rouviere, Mr Matthew *Rathbone-place*

Ruggles, Thomas Eſq. *Clare, Suffolk*

P Ruſſel, Jeſſe Eſq. *Goodman's-fields*

Ryder, Thomas Eſq. *Oxford-ſtreet*

Sandwich,

S.

Sandwich, John Earl of

P Shaftſbury, Anthony Earl of F.R. and A.S.

Scarborough, George Auguſtus Earl of

P Stanhope, Charles Earl F.R.S.

P Scarſdale, Nathaniel Lord

Skipwith, Sir Thomas George Bart. *Harley-ſtreet*

† Sinclair Sir John Bart. M.P. F.R. and A.S. *Whitehall*

P St Aubin, Sir John Bart. M.P. and F.A.S. *North-audley ſtreet*

† Staunton, Sir George Bart. F.R.S. *St James's-place*

St Barbe, John Eſq. *Seething-lane*

Saffory Mr Henry, *Devonſhire-ſtreet, Biſhopſgate-ſtreet*

Sadler, Mr James *Queen-ſtreet, Cheapſide*

P Salvador, Joſeph Eſq. F.R. and A.S.

Sandeman, David Eſq. *America-ſquare*

Satterthwaite Mr John *Mincing-lane*

Savage, Thomas M.D. *Conduit-ſtreet*

Saunders, Thomas Eſq. *Haydon-ſquare, Minories*

Saunders, Mr George *Oxford-ſtreet*

Saunders, Mr Edward Gray *Briantſton-ſtreet*

Savage, Mr Samuel jun. *Chiſwell-ſtreet*

Sayer, Henry Eſq. *Lincoln's-inn*

Seale,

Seale, Mr David *Tower-ſtreet*

Seddon, Mr Thomas *Alderſgate-ſtreet*

P Selby, Henry Collingwood Eſq. *Twickenham-common, Middleſex*

Sellon, William Marmaduke Eſq. St *James's-walk Clerkenwell*

Sellon, Baker John Eſq. *Hart-ſtreet, Bloomſbury*

P Selwin, Thomas Eſq. *Soho-ſquare*

Serra, Mr Iſaac *King's-road, Gray's-inn-lane*

P Shakeſpear, Mr George *Oxford-ſtreet*

Sheldon, Mr Thomas *Tottenham-court-road*

Shepherd, Thomas Eſq. *Furnival's-inn*

Sherſon, Robert Eſq. *New Bridge-ſtreet, Blackfriars*

P Shipley, Mr William Gent. *Maidſtone, Kent*

P Shore, Samuel Eſq. *Norton-hall, Derbyſhire*

P Shore, Samuel jun. Eſq. *Lincoln's-inn*

Shrubb, John Peyto Eſq. *Thames Ditton*

Sibley, Joſeph Eſq. *Hatton-ſtreet*

Sidebotham, Mr Peter *Great Portland-ſtreet*

Skinner, Thomas Eſq. Alderman *Alderſgate-ſtreet*

P Skottow, Nicholas Eſq. *Berners-ſtreet*

Slade, John Eſq. *Hammerſmith*

Slinger, John Eſq. *Caton, Lancaſhire*

Small, Mr Alexander *Great Ruſſel-ſtreet*

Smirnove, Rev. James

* Smith, George Eſq.

Smith,

Smith, William Eſq. M.P. *Clapham*
Smith, Mr Charles *Conduit-ſtreet*
Smith, Mr John *Lad-lane*
Smith, Joſhua Eſq. *Great George-ſtreet, Weſtminſter*
Smith, Mr Dedrick *Gerard-ſtreet*
* Smith, Mr Nathan *Knightſbridge*
Smith, Worge Eſq. *Suffolk-ſtreet, Charing-croſs*
Smithers, Mr Henry St. *Mary Overy's, Southwark*
Snaith, Mr Thomas *Vauxhall*
Songa, Anthony Eſq. *Copthall-court, Throgmorton-ſtreet*

Spackman, Mr James *Jewry-ſtreet, Aldgate*
Spencer, Henry Eſq. *Dulwich*
Spengler, John Eſq. *Johnſon's-court, Fleet-ſtreet*
Spilſbury, Mr Thomas *Snow-hill*
Stanhope, Walter Spencer Eſq. M.P. *Upper Brook-ſtreet*

Stackpoole, George Eſq. *Groſvenor-place*
Stapleton, Tobias Eſq. *Clements-inn*
* Steele, Joſhua Eſq. *Barbados*
Steers, John William Eſq. *Fig-tree-court, Temple*
Stephens, Phillip Eſq. M.P. F.R.S. *Admiralty*
†† Stephens, Francis Eſq. F.A.S. *Adelphi*
Stockwell, John Eſq. *Crutched-friars*
Stone, Mr Thomas
Stone, Daniel A.B. *Univerſity-college*

Storer,

Storer, Thomas Eſq. F A.S. *Golden-ſquare*
Story, Thomas Eſq. *Mirehouſe*, near *Carliſle*
Storey, Robert Eſq. *Lamb's Conduit-ſtreet*
Strachan, James Eſq. *Mincing-lane*
Street, Mr James Wallis *Bucklerſbury*
Strutt, Mr Jedediah *Derby*
Sturch, Mr William *Stanhope-ſtreet*, *Clare-market*
Sturt, Charles Eſq. M.P. *St James's-ſquare*
Sulivan, Richard Joſeph Eſq. M.P. F. R. and A. S. *Cleveland-row*
Sulivan, John Eſq. *Arlington-ſtreet*
Supple, Richard Eſq. *Great Oakley*, *Northamptonſhire*
P Supple Richard Brooke Eſq. *Ditto*
Swain, Samuel Eſq. and Alderman, *Moorfields*
Swan, Henry Eſq.
Symmons, John Eſq. *Groſvenor-houſe*, *Milbank*

T.

Taylor, William Eſq. *Charlotte-ſtreet*, *Bedford-ſq.*
Teixera, Abraham David Eſq. *Biſhopſgate-ſtreet*
Thomas, David Eſq. *Pay-office*, *Horſe-guards*
Thomas, Mr William *Charlotte-ſtreet*, *Portland-place*
Thomſon, Andrew Eſq. *Auſtin-friars*
Thompſon, Mr George *Duke-ſtreet*, *York-buildings*
P Thornton, John Eſq. *Clapham*
P Thornton, Samuel Eſq. *Ditto*

Thornbury,

Thornbury, William Eſq. *Jermyn-ſtreet*
Thorkalin, Grime Johnſon, L.L.D. *Copenhagen*
Towgood, John Eſq. *Clement's-lane, Lombard-ſtreet*
Towgood, William Eſq. *Bread-ſtreet-hill*
Towne Mr Francis, St *James's-ſtreet*
†† Towry George Phillips Eſq. *Victualing-office*
Timſon, William Eſq. *Tooting*
Trenchard, John Eſq. *Old Bond-ſtreet*
Trotter, Alexander Eſq. *Grafton-ſtreet, Fitzroy-chapel*
Troward, Richard Eſq. *Norfolk-ſtreet, Strand*
P Tunſtall, Marmaduke Eſq. F.R. and A.S. *Wycliffe, Yorkſhire*
Turner, Richard L.L.D. *Loughborough-houſe*
Tyers, Mr James *Little Eaſtcheap*

U.

P Uxbridge, Henry Earl of F.A.S.
Udny, Robert Eſq. F.R. and A.S. *Berner's-ſtreet*

V.

P Valencia, Richard Lord Viſcount
P Verney, Ralph Earl F.R.S.
Vernon, George Venables Lord *Park-place*
Vallengen, Naſſau, De. Eſq. *Hermes-hill*
Vaughan, Benjamin Eſq. *Jeffrey's-ſquare, St Mary-axe*

Vaughan, Mr George *Strand*
Vaughan, Mr William *Mincing-lane*
Vernet, Monſ. Sculptor, *Paris*
Vetch, Mr John

W.

P Warwick, George Earl of F.R. and A.S.
P Winchilſea, George Earl of
P Winterton, Edward Earl F R.S.
P Widrington, Henry Lord
* Walpole, Honourable Horatio M.P. F.R. and A.S.
* Williams Sir Edward, Bart.
P Webb, Sir John Bart. F.R. and A.S.
P Willes, Sir Francis Kt. *Queen-ſtreet, May-fair*
Walcot, William Eſq. F.A.S. *Inner-Temple*
Walker, James Eſq. St *George's-fields*
Walker, Mr John *Lincoln's-inn fields*
Walker, John A.M. *Oriel College*
Waller, Charles Eſq. *Strand*
Waller, William Eſq. *Coney-court, Gray's-inn*
P Walſh, John Eſq. F.R. and A.S. *Cheſterfield-ſtreet*
Walter, Mr John *Blackfriars*
* Warde, Captain George *Bradfield-houſe*
Wanſey, Mr John *Lothbury*
Ward, Mr John *Air-ſtreet, Piccadilly*
P Waring, Richard Hill Eſq. F.R.S. *Inner-temple*

Waters,

Waters, Mr Edward *May's-buildings*

Waugh, Mr Joſeph *Dowgate-hill*

†† Webſter, Edward Eſq. *Liſſon-green, Paddington*

Wedgwood, Joſiah Eſq. F. R. and A. S. *Etruria, Staffordſhire*

Wedgwood, Mr John *Ditto*

Weſton, Robert Eſq. F.R. and A.S. *Norfolk-ſtreet, Strand*

Weſt, Thomas Thompſon Eſq. *Crown-court, Cheapſide*

Weſtmacott, Mr Richard, *Mount-ſtreet, Groſvenor-ſquare*

Whitbread, Samuel Eſq. M.P. *Portman-ſquare*

White, Thomas Eſq. *Retford, Nottinghamſhire*

† White, John Eſq. *Weymouth-ſtreet, Mary-le-bone*

White, Mr William *Garlick-hill*

White, Mr William Wood *Leadenhall-ſtreet*

P White, Rev. Stephen L. L. D. *Charlotte-ſtreet, Bloomſbury*

Whitefoord, Caleb Eſq. F. R. S. *Craven-ſtreet, Strand.*

Whitehead, George Eſq. *Baſinghall-ſtreet*

Whitehurſt, Mr Thomas *Bull-wharf, Thames ſtreet*

P Whitefield, Henry Fotherby Eſq. *Rickmanſworth, Herts*

Wiedeu, William De Eſq. *Riga in Livonia*

Wilkinſon,

Wilkinſon, John Eſq. *Broſely, Shropſhire*
Wilkinſon, John Eſq. *Harley-ſtreet, Cavendiſh-ſquare*
Wilberforce, William Eſq. M.P.
Willet, Ralph Eſq. F.R. and A.S. *Dean-ſtreet, Soho*
Williams, George Griffies Eſq. *Caermarthen*
Williams, Thomas Eſq. *Llanidan, Angleſea*
P Willis, William Eſq. *Lombard-ſtreet*
Willan, Robert M.D. *Ely-place*
Wilmot, Henry Eſq. *Bloomſbury-ſquare*
Wilſon, Mr Thomas *Friday-ſtreet*
Wilſon, Mr George *Henrietta-ſtreet, Covent-garden*
Wilſone, Mr William *Baſinghall-ſtreet*
Winlaw, Mr William *Margaret-ſtreet, Cavendiſh-ſquare*
P Winne, Captain Iſaac Laſcelles, *Philpot-lane, Fenchurch-ſtreet*
Wittenoom, Mr Thomas *Knight-rider-ſtreet*
Winter, George Eſq *Charlton* near *Briſtol*
Woodbine, William Clarke Eſq. *Raynham Norfolk*
Wolff, Jens Eſq. *Wellcloſe-ſquare*
P Wooton, William Samuel Eſq. *Strand*
P Wright, Mr Richard *Fenchurch-ſtreet*
Wright, Mr Gabriel *Leadenhall-ſtreet*
Wright, Mr John *Lombard-ſtreet*
Wrighte, Rev. Thomas William A.M. Fellow of *Queen's College, Cambridge*

Wyatt,

Wyatt, Thomas Eſq. *Rowd*, near *Deviſes*, and *New-inn*

Wyatt, Samuel Eſq. *Albion-mills*

†† Wynne, John Eſq. *Figtree-court, Temple*

Wynne, William L.L.D. *Doctor's-commons*

Wright, John Eſq. *Abingdon-ſtreet*

Y.

Young, Mr Lake *Watling-ſtreet*

Young, Arthur, Eſq. F.R.S. *Bradfield-hall, Suffolk*

Young, Mr Thomas *Alderſgate-ſtreet*

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